

Index

Reactor Materials

Volume 9

Note: The page range for each of the four issues of Vol. 9 is as follows:
No. 1, pages 1 to 72; No. 2, pages 73 to 150; No. 3, pages 151 to 202;
No. 4, pages 203 to 265.

- 1541 alloy (irradiated)
 - tensile properties, 241
- A-110 AT (irradiated)
 - properties, 192
- A-356 (irradiated)
 - properties, 192
- Actinide elements
 - diffusion in UO_2 compacts, 82
- Adhesives
 - ultrasonic testing, 263
- Alkali metals (molten)
 - corrosive effects, 107
- Alloy 718
 - physical metallurgy, 50-51
- Alloys
 - brazing, corrosion of, 36
 - corrosion, 107
 - diffusion in, 131-32
 - reactions with water, 41-43
 - stress-corrosion cracking, 175
- Alloys (irradiated)
 - properties, 117, 192
- Alloys (refractory metal)
 - chemical plating of, 199
 - protective coatings for, 199
 - thermal properties, 184
 - welding, 142-44
- Alloys (refractory metal)(irradiated)
 - properties, 115, 241-43
- Alloys (refractory metal)(Nb-refractory metal)
 - properties, 115, 241-43
- Aluminum
 - bonding, 68, 147, 198
 - coating of Nb and Nb alloys with, 199
 - corrosion, 36, 103, 177-78
 - extrusion of honeycomb structure, 64
 - Ni deposition on, 140
 - plating on U, 151, 200
 - reaction with UO_2 , 82
 - reaction with water, 43
 - solubility in molten Zn, 236
 - solubility in Y_2C_3 , 131
 - ultrasonic testing for fatigue cracks, 200
 - welding, 68
- Aluminum (irradiated)
 - corrosion, 174
 - lattice parameters, 49
 - primary knock-on recoil spectrum, 192-53
- Aluminum (molten)
 - U diffusion in, 189
- Aluminum (Ni plated)
 - corrosion, 103
- Aluminum (SAP)
 - deformation, 123
 - plasticity, 243
 - thermal conductivity, 243
- Aluminum alloy coatings (Al-U)
 - oxidation, 66
- Aluminum alloy dispersions (Al(1100)- PuO_2)
 - development, 9
- Aluminum alloy tubes (Al-Fe-U)(Zircaloy clad)(irradiated)
 - swelling, 2-4
- Aluminum alloys
 - (see also A-356(irradiated))
 - cavitation, 105
 - chemical milling, 141-42
 - Ni deposition on, 140
 - ultrasonic testing for fatigue cracks, 200
 - welding, 260-61
- Aluminum alloys (1100)
 - corrosion, 36
 - fatigue behavior, 180
 - use in brazing of Be, 168
- Aluminum alloys (6061)
 - electroplating with Ni, 259
- Aluminum alloys (6061)(irradiated)
 - properties, 115, 192
- Aluminum alloys (6061-T6)
 - corrosion, 36
- Aluminum alloys (7075)(irradiated)
 - properties, 192
- Aluminum alloys (Al-Be)
 - phase studies, 92-93
- Aluminum alloys (Al-Cr-Fe-Y)
 - (see also 1541 alloy)
 - oxidation, 79
 - properties, 244-45
- Aluminum alloys (Al-Cr-Fe-Y)(irradiated)
 - ductile-brittle transition temperature, 115
 - hardness, 115
 - tensile properties, 190
- Aluminum alloys (Al-Cr-Ti-V)
 - friction welding, 68
- Aluminum alloys (Al-Cr-V)
 - corrosion, 109, 233
- Aluminum alloys (Al-Cr-V-Y)
 - fabrication, 255-56
- Aluminum alloys (Al-Cr-V-Zr)
 - fabrication, 255-56
- Aluminum alloys (Al-Hf-Nb)
 - oxidation, 100
- Aluminum alloys (Al-Hf-Ta)
 - oxidation, 100
- Aluminum alloys (Al-Fe-U)
 - precipitate solution in, 73
 - UAl_2 precipitates in, 151-52
- Aluminum alloys (Al-Mg-Zr)
 - creep properties, 251
- Aluminum alloys (Al-Mo-Ti-V)
 - properties, 183
- Aluminum alloys (Al-Mo-U)(Al clad) (irradiated)
 - properties, 203-4
- Aluminum alloys (Al-Nb-Ta-Ti)
 - crack growth, 230
 - welding, 145
- Aluminum alloys (Al-Sn)
 - coating of Nb and Nb alloys with, 199
- Aluminum alloys (Al-Ti-V)
 - crack growth, 230
 - welding, 68, 145
- Aluminum alloys (Al-U)
 - transformation, 1, 74
- Aluminum alloys (Al-V)
 - corrosion, 109
- Aluminum alloys (Al-Y)
 - corrosion, 103
- Aluminum alloys (Al-Zn)
 - corrosion, 103
- Aluminum alloys (Al-Zr)
 - electrodeposition of, 140-41
- Aluminum alloys (high strength)
 - fracture strength, 117
- Aluminum alloys (irradiated)
 - damage, 115
- Aluminum coatings (Al-Sn)
 - behavior, 231-32
- Aluminum dispersion films (Al- UAl_4) (irradiated)
 - fission-fragment tracks, 17
- Aluminum dispersions (Al-Eu molybdate- Eu_2O_3)(Al clad)(irradiated)
 - dimensional stability, 101
- Aluminum dispersions (Al-U aluminide)
 - fabrication, 208
- Aluminum dispersions (Al-U aluminide) (irradiated)
 - properties, 208
- Aluminum fused slurry coatings
 - development and evaluation, 106
- Aluminum intermetallic compound coatings (UAl_3)
 - oxidation, 66
- Aluminum intermetallic compound dispersion films (Al- UAl_4)(irradiated)
 - fission-fragment tracks, 17

- Aluminum intermetallic compound dispersions (Al-U aluminide)
fabrication, 208
- Aluminum intermetallic compound dispersions (Al-U aluminide)(irradiated) properties, 208
- Aluminum intermetallic compounds (UAl₃)
precipitation in Al-Fe-U alloys, 151-52
preparation, 208
- Aluminum intermetallic compounds (UAl₃)
preparation, 208
- Aluminum mixtures (Al-B₄C)(Al clad)
fabrication, 228
- Aluminum mononitride powder
preparation, 13
- Aluminum mononitride system compacts (AlN-UN)
fabrication, 13
- Aluminum oxide
casting, continuous, 255
corrosion, 40
joining to Nb-Zr alloy, 146
sealing to Nb, 59
strength, 58-59, 193
- Aluminum oxide cermets
corrosion, 235
- Aluminum oxide coatings
for W, 38, 105
- Aluminum oxide coatings (Al₂O₃-Cr₂O₃)
application, 257
- Aluminum oxide particles
strain fields around, in Al-Al₂O₃ foils, 53
- Aluminum oxide powder
coating with Mo and W, 139-40
compaction, 142
- Aluminum system films (Al-Si)
annealing and growth, 259
- Aluminum oxide system foils (Al-Al₂O₃)
strain fields in, 53
- Aluminum oxide systems (Al-Al₂O₃)
work hardening, recovery of, 183
- Aluminum system foils (Al-Al₂O₃)
strain fields in, 53
- Aluminum system tubes (Al-Fe-Si-U)
(Zircaloy clad)(irradiated)
swelling, 2-4
- Aluminum systems (Al-Al₂O₃)
work hardening, recovery of, 183
- Aluminum systems (Al-B)
fabrication, 100
- Aluminum systems (Al-C-Ti-Zr)
mechanical properties at high temperatures, 123
- Aluminum systems (Al-C-Y)
phase studies, 131
- Aluminum systems (Al-Eu₂O₃)
fabrication, 100-1
- Aluminum systems (Al-HfO₂)
fabrication, 100
- Aluminum systems (Al-Fe-Mo-Si-U)
hardness, 2
- Aluminum systems (Al-Fe-Ni-Si)
corrosion, 103
- Aluminum systems (Al-Si)
corrosion, 103
- Aluminum tubing
explosive welding to Zircaloy-4
tubing, 260
- Americium
diffusion in UO₂, 82, 245
- Antimony
solubility in molten Zn, 236
- Antimony alloys (Sb-Zr)
H terminal solubility in, 28
- Arsenic
solubility in molten Zn, 236
- As-30
creep properties, 181
- AS-55
corrosion, 40
welding, 143
- Autoclaves
design and operation of high-pressure, 142
- B33
corrosion, 40
- B-66
coatings for, 38, 231-32
corrosion, 40, 231
diffusion bonding, 64
evaporation loss, 124-25
welding, 142-44
- B-66 foils (coated)
properties, 38
- B-66 tubing
fabrication, 257
- Barium
diffusion in graphite, 91
phase diagrams, 186
solubility in molten Zn, 236
- Bearing materials (journal)
corrosion, 40
- Beryllide coatings
corrosion-resistant, 27
- Beryllides
oxidation, 27
- Beryllium
analysis, 93-94, 220
anodizing, 67
bonding, 68, 147, 257
brazing, 94, 146, 168, 261
compatibility studies, 25-26, 37, 94
contamination of, 23
corrosion, 177-78, 220-21
critical-resolved-shear stresses, 22-23
electrodeposition of metals on, 67
fabrication, 24-25, 167-68, 220
impurities in commercial, 23
inclusions in commercial, 23
Fe diffusion in, 248
mechanical properties, 22, 24, 93
metallography at high temperatures, 93
physical metallurgy, 167-68
properties, 22-24
purification, 22-24, 168
recrystallization, 93
Ag diffusion in, 248
solubility in molten Zn, 236
surface-recession rates, 125
vapor deposition, 66
- Beryllium (irradiated)
crystal orientation, 219
oxidation, 94
properties, 115, 169
tensile properties, 241
- Beryllium alloys
development, 168
- Beryllium alloys (Al-Be)
phase studies, 92-93
- Beryllium alloys (Be-Ca)
recrystallization, 93
- Beryllium alloys (Be-Cr)
phase studies, 92-93
- Beryllium alloys (Be-Cu)
fabrication, 24-25
mechanical properties, 219
phase studies, 92-93
production by sput cooling, 219
strength, 25
- Beryllium alloys (Be-Fe)
mechanical properties, 219
phase studies, 92-93
- production by sput cooling, 219
- Beryllium alloys (Be-Ag)
phase studies, 92-93
- Beryllium alloys (Be-Ni)
mechanical properties and production, 219
- Beryllium alloys (Be-Ti-Zr)
use for brazing, 146
- Beryllium fluoride systems (BeF₂-LiF-UF₄-ZrF₄)(molten)
corrosive effects, 110
- Beryllium intermetallic compounds, 27, 168
- Beryllium oxide
phase transformation, 169
strength, 26, 193, 221-23
thermal conductivity, 193
thermal diffusivity, 26
- Beryllium oxide (irradiated)
behavior, 94, 96
compatibility with irradiated graphite, 217
microcracking, 223
thermal diffusivity, 26
- Beryllium oxide mixtures (BeO-UO₂)
creep properties, 58
- Beryllium oxide systems (Be-BeO)
(irradiated)
behavior, 94
- Beryllium oxide systems (BeO-MgO-SiC)
properties, 223
- Beryllium oxide systems (BeO-PuO₂-ThO₂)
phase studies, 8
- Beryllium oxide systems (BeO-SiC)
properties, 223
- Beryllium oxide systems (BeO-ThO₂-UO₂-Y₂O₃)
UO₂ loss, 26-27
- Beryllium oxide systems (BeO-ThO₂-UO₂-Y₂O₃)(irradiated)
fission-gas release, 27
- Beryllium powder
gas-pressure bonding, 64
sintering, 25
- Beryllium sheet
fabrication and properties, 220
- Beryllium single crystals
mechanical properties, 218-19
Ag diffusion in, 248
- Beryllium systems (Be-BeO)(irradiated)
behavior, 94
- Beryllium tubes
use for fuel-element cladding, 25
- Billets
casting for NPR fuel, 63
- Bismuth
solubility in molten Zn, 236
- Bismuth alloys (Bi-Sn)(molten)
corrosive effects, 236
- Bismuth (molten)
U diffusion in, 188
- Bismuth alloys (Bi-Pb)(molten)
wetting effects, 178
- Bonding, 64, 68, 142, 147, 200, 257
- Borides
hardness, 251
- Boron
use in stainless-steel (304) cladding, 99
vapor deposition on Ti, 66
- Boron carbide (stainless-steel (316) clad)
corrosion, 177
- Boron carbide dispersions (B₄C-glass)
(stainless-steel (321) clad)(irradiated)
performance, 32
- Boron carbide mixtures (Al-B₄C)(Al clad)
fabrication, 228
- Boron carbide mixtures (B₄C-graphite)
preparation, 228
- Boron carbide spherules
preparation, 101

- Boron fused slurry coatings
development and evaluation, 106
- Boron nitride
corrosion, 40
- Boron nitride powder
compaction, 142
- Boron nitride systems
oxidation, 132
- Boron oxide
melting point, 173
- Boron oxide systems (B_2O_3 - WO_3)
phase studies, 173
- Boron powder
purification, 228
- Boron system cladding (B-stainless steel)
(irradiated)
performance, 226, 228
- Boron systems (Al-B)
fabrication, 100
- Boron systems (B-Cr-Ni)
(see CM 60)
- Boron systems (B-Cr-Ni-Si)
(see CM 53)
- Boron systems (B-Cu)(irradiated)
He precipitation in, 192
- Boron systems (B-Ni-Si)
(see CM 52)
- Boron systems (B-Nb)
mechanical properties, 127
- Boron systems (B-Th)(Zr clad)
fabrication, 257
- Boron systems (B-Zr)
sintering, 34
- Brass 70/30
explosive cladding of mild steel with, 67
- Braze joints
nondestructive testing, 70
- Brazing, 142-47, 260-63
- Brazing alloys
corrosion, 36
- Brazing foils
nondestructive testing, 70
- Brittle materials
Poisson's ratio and shear properties, 121
- Bubbles (fission gas)
migration, 17, 87
- C**
- C-129
corrosion, 40
- C129Y
properties, 246
welding, 142-43
- C-129Y (V-modified disilicide coated)
properties, 38
- C-1294
evaporation loss, 124-25
- Cadmium
solubility in molten Zn, 236
- Cadmium (molten)
corrosion effects, 178, 236
U diffusion in, 188
- Cadmium alloys (Cd-Eu)
phase studies, 226
- Cadmium alloys (Cd-In-Ag)(plated)
(irradiated)
mechanical properties, 32
- Cadmium alloys (Cd-Mg)(molten)
corrosive effects, 178-79
- Cadmium alloys (Cd-Mg-Zn)(molten)
corrosive effects, 178-79
- Cadmium alloys (Cd-Sr)
phase studies, 226
- Calcium
corrosion, 177-78
phase diagrams, 186
solubility in molten Zn, 236
- Calcium alloys (Be-Ca)
recrystallization, 93
- Calcium oxide systems (CaO - PuO_2 - UO_2 - ZrO_2)
melting points, 78
- Calcium oxide systems (CaO - ZrO_2)
thermal conductivity, 193
- Carbide cermets
development, 79
- Carbide coatings (refractory)
for Ta, 38
- Carbide fuels (clad)(irradiated)
behavior, 79
- Carbides
casting, 101, 255
corrosion, 110
- Carbides (Co bonded)
corrosion, 107-8
- Carbides (Grade 7178)
corrosion, 40
- Carbides (Mo bonded)
corrosion, 107-8
- Carbides (Ni bonded)
corrosion, 107-8
- Carbonyl 907
corrosion, 40
- Carbonyl 999
corrosion, 40
- Carbon
(see also Graphite)
activity in UC, 84
activity in UC_2 , 84
chemical deposition, 66
corrosion, 177-78
diffusion in Cr, 132
diffusion in Nb carbide, 189
diffusion in Ta carbide, 189
diffusion in Zr, 132
self-diffusion in UC, 211-12
solubility in refractory metals, 51
solubility in UC_2 , 84
- Carbon (irradiated)
contraction, 218
properties of heat-treated, 217-18
- Carbon (pyrolytic)(irradiated)
thermal diffusivity, annealing effects
on, 20-21
- Carbon coatings (pyrolytic)
characterization of, for fuel particles, 80
deposition on fuel particles, 209-10
development, 156-57
- Carbon coatings (pyrolytic)(irradiated)
properties, 217
- Carbon monoxide mixtures (CO-water vapor)
radiolysis, 20
- Carbon system particles (C-U-Zr)
(irradiated)
behavior, 13
- Carbon systems (Al-C-Ti-Zr)
mechanical properties at high temperatures, 123
- Carbon systems (Al-C-Y)
phase studies, 131
- Carbon systems (C-Cr-Co-Fe-Ni-W)
(see Star J)
- Carbon systems (C-Cr-Co-Mo-W-Y)
oxidation and strength, 131
- Carbon systems (C-Cr-Co-Nb-W-Y)
oxidation and strength, 131
- Carbon systems (C-Cr-Co-Ta-W-Y)
oxidation and strength, 131
- Carbon systems (C-Cr-Fe-Ni-N)
stress-corrosion cracking, 104
- Carbon systems (C-Cr-Zr)
phase studies, 50
- Carbon systems (C-Co-Zr)
phase studies, 244
- Carbon systems (C-Hf)
phase studies, 101
- Carbon systems (C-Hf-Ta)
phase studies, 32
- Carbon systems (C-Hf-Ta-W)
(see T-222)
- Carbon systems (C-HfC)
tensile properties, 101-2
- Carbon systems (C-Fe-Nb)
phase studies, 246
- Carbon systems (C-metal)
melting and casting apparatus for, 256
- Carbon systems (C-Mo)
phase studies, 51
- Carbon systems (C-Mo-Nb-Ti-Zr)
fabrication and properties, 51
- Carbon systems (C-Mo-Ti-Zr)
(see also TZC)
creep-rupture properties, 118
fabrication, 51, 138
properties, 51
- Carbon systems (C-Mo-Zr)
phase studies, 50
- Carbon systems (C-Ni-U)
phase studies, 211
- Carbon systems (C-Nb-W-Zr)
cold working, 127
corrosion, 233-34
- Carbon systems (C-Nb-Zr)
corrosion, 108
development, 52
phase studies, 128
- Carbon systems (C-N-Pu)
hardness, 8
- Carbon systems (C-O-Pu)
phase studies, 207
- Carbon systems (C-Pu)
vapor pressure, 78
- Carbon systems (C-Pu-Th)
phase studies, 12
- Carbon systems (C-Ta-W)
(see K601)
- Carbon systems (C-Th)
phase studies, 12
- Carbon systems (C-W-Zr)
phase studies, 50, 128
- Carbon systems (C-U)
aging effects, 152
casting, 83
melting, 83
melting point, 74
precipitates in, 152
- Carbon tetrachloride
reaction with burning Pu, 6
- Casting, 63-64, 138, 197-98, 255-57
- Ch-752
coatings for, behavior of, 231-32
corrosion, 40
creep properties, 249-50
welding, 143, 262
- Ch-752 foils (coated)
properties, 38
- Ceramic coatings
fission-product migration through, 10
- Ceramic fibers
preparation, 132
- Ceramic powders (irradiated)
fission-gas release, 162
- Ceramic whiskers
preparation, 132
- Ceramics
fabrication, 193
joining to metals, 146-47
oxidation, 132
technology, 58-59, 251
wetting of U, by liquid Na, 110
- Ceramics (irradiated)
fission-gas diffusion in, 213

- Cerium**
diffusion in graphite, 91
solubility in molten Zn, 236
W solubility in, 247
- Cerium alloys (Ce-Fe-Pu)**
phase studies, 77
- Cerium alloys (Ce-Pu) (molten)**
viscosities, 6, 75, 77
- Cermet coatings**
corrosion of plasma-sprayed, 108
- Cermet fuels**
development, 79
- Cermet fuels (irradiated)**
burnup, 79
- Cermets**
corrosion, 235
mechanical properties, 155
- Cesium**
phase diagrams, 186
- Cesium (molten)**
corrosive effects, 235
- Cesium (vaporized)**
corrosive effects, 40
- Chromium**
annealing on U, 67
C diffusion in, 132
compatibility with Eu molybdate, 100
compatibility with Pu-Th-U alloys, 9
compatibility with $\text{Pu}_2\text{C-U}_0.5\text{C}$ system, 8
corrosion, 177-78
deposition of, 140
diffusion in U, 248-49
electrodeposition of, 67, 260
electroplating with Cr-Re alloy, 198
ion plating on U, 200
mechanical properties, Y effects on, 53
melting point, annealing effects on, 246
Mo diffusion in, 132
notch impact properties, 250
phase diagrams, 186
reaction with PuC-UC system, 159
solubility in molten Li, 107
solubility in molten Zn, 236
stainless-steel (304) corrosion-product deposition on, 36
- Chromium (irradiated)**
lattice parameters, 49
- Chromium alloys (Al-Cr-Fe-Y)**
(see also 1541 alloy)
oxidation, 79
properties, 244-45
- Chromium alloys (Al-Cr-Fe-Y) (irradiated)**
ductile-brittle transition temperature, 115
hardness, 115
tensile properties, 190
- Chromium alloys (Al-Cr-Ti-V)**
friction welding, 68
- Chromium alloys (Al-Cr-V)**
corrosion, 109, 233
- Chromium alloys (Al-Cr-V-Y)**
fabrication, 255-56
- Chromium alloys (Al-Cr-V-Zr)**
fabrication, 255-56
- Chromium alloys (Be-Cr)**
phase studies, 92-93
- Chromium alloys (Cr-Co-Fe-Ni-W)**
(see L-605)
- Chromium alloys (Cr-Co-Mo-Ni)**
(see Udimet 700)
- Chromium alloys (Cr-Co-Ni-W)**
(see Haynes 25)
- Chromium alloys (Cr-Hf-Ta)**
oxidation, 100
- Chromium alloys (Cr-Fe) (irradiated)**
 ^{135}Xe release during heating, 190
- Chromium alloys (Cr-Fe-Ni)**
(see Alloy 718)
- Chromium alloys (Cr-Fe-Ni-Nb) (irradiated)**
ductility, B effects on, 112
- Chromium alloys (Cr-Fe-Ni-Ti) (irradiated)**
ductility, B effects on, 112
- Chromium alloys (Cr-Fe-Sn-Zr)**
corrosion and mechanical properties, 103
- Chromium alloys (Cr-Fe-Zr)**
corrosion and mechanical properties, 103
- Chromium alloys (Cr-Ni)**
compatibility with PuO_2 , 207
oxidation, 174
- Chromium alloys (Cr-Ni) (irradiated)**
fission-fragment damage, 190
- Chromium alloys (Cr-Ni-Nb) (irradiated)**
fission-fragment damage, 190
stress-rupture properties, annealing effects on, 191-92
- Chromium alloys (Cr-Nb)**
mechanical properties, 127
- Chromium alloys (Cr-Nb-U)**
transformation, 1
- Chromium alloys (Cr-Re)**
electrodeposition on Cr, Cu, Mo, and W, 198
notch impact properties, 250
- Chromium alloys (Cr-Ti-V)**
corrosion, 257
creep properties, 186
fabrication, 257
- Chromium alloys (Cr-U)**
phase changes, kinetics of, 152
transformation, 1
- Chromium alloys (Cr-U-V)**
phase studies, 204
- Chromium alloys (Cr-U) (molten)**
corrosive effects, 236
- Chromium alloys (Cr-V)**
corrosion, 109
- Chromium alloys (Cr-Y)**
mechanical properties, 53
- Chromium alloys (Cr-Y) (hydrided) (clad)**
cracking, 97
- Chromium alloys (Cr-Y) (hydrided) (clad) (irradiated)**
behavior, 97
- Chromium alloys (Cr-Zr)**
corrosion, 36
- Chromium coatings (Cr-Si-Ti), 38, 106, 231-32**
- Chromium disilicide**
oxidation and thermal dilation, 106
- Chromium dispersions**
cladding materials for, 79
- Chromium fused slurry coatings**
development and evaluation, 106
- Chromium intermetallic compounds (CrBe₁₂)**
oxidation, 27
- Chromium oxide coatings (Al₂O₃-Cr₂O₃)**
application, 257
- Chromium powder**
use as binder for ZrB₂, 172
- Chromium systems (B-Cr-Ni)**
(see CM 60)
- Chromium systems (B-Cr-Ni-Si)**
(see CM 53)
- Chromium systems (C-Cr-Co-Fe-Ni-W)**
(see Star J)
- Chromium systems (C-Cr-Co-Mo-W-Y)**
oxidation and strength, 131
- Chromium systems (C-Cr-Co-Nb-W-Y)**
oxidation and strength, 131
- Chromium systems (C-Cr-Co-Ta-W-Y)**
oxidation and strength, 131
- Chromium systems (C-Cr-Fe-Ni-N)**
stress-corrosion cracking, 104
- Chromium systems (C-Cr-Zr)**
phase studies, 50
- Chromium systems (Cr-SiC)**
oxidation, 132
- Chromium systems (Cr-stainless steel)**
stress rupture in liquid metal, 233
- Chromium trioxide powder**
compaction, 142
- Cladding, 64-67, 139-42**
- Cladding materials, 35-62, 103-37, 174-96, 229-54**
- CM 52**
corrosion as brazing alloy, 176
- CM 53**
corrosion as brazing alloy, 176
- CM 60**
corrosion as brazing alloy, 176
- Coast Alloy 52**
corrosion of brazed joints using, 40
- Coatings**
(see also Films (thin))
ion plating of, 199-200, 259
oxidation-resistant, 38-39
for refractories, 38-39, 105-6, 175, 199
- Coatings (ceramic)**
fission-product migration through, 10
- Coatings (cermet)**
corrosion of plasma-sprayed, 108
- Coatings (fused slurry silicide)**
development and evaluation, 106
- Coatings (pack-cementation)**
development, 106
- Coatings (silicide)**
for T-222, 232-33
thermal stresses of, on refractory metals, 106
- Cobalt**
corrosion, 177-78
diffusion in U, 248-49
phase diagrams, 186
solubility in molten Zn, 236
tensile strength of electrodeposited, 67
- Cobalt alloys**
corrosion, 177-78
- Cobalt alloys (Cr-Co-Fe-Ni-W)**
(see L-605)
- Cobalt alloys (Cr-Co-Mo-Ni)**
(see Udimet 700)
- Cobalt alloys (Cr-Co-Ni-W)**
(see Haynes 25)
- Cobalt alloys (Co-Cu) (irradiated)**
precipitation, 115-16
- Cobalt alloys (Co-Fe-Ni)**
corrosion, 235
- Cobalt alloys (Co-Ni)**
tensile properties of electrodeposited, 66-67
- Cobalt alloys (Co-W)**
vapor deposition, 258
- Cobalt alloys (U-UCo₂-UMn₂)**
phase studies, 152-53
- Cobalt dispersions (Co-DysO₃) (stainless-steel (304) clad) (irradiated)**
performance, 32
- Cobalt intermetallic compounds (Pu₂Co)**
physical properties, 153
- Cobalt intermetallic compounds (U.Co)**
solid solubility, 153
- Cobalt systems (C-Cr-Co-Fe-Ni-W)**
(see Star J)
- Cobalt systems (C-Cr-Co-Mo-W-Y)**
oxidation and strength, 131
- Cobalt systems (C-Cr-Co-Nb-W-Y)**
oxidation and strength, 131
- Cobalt systems (C-Cr-Co-Ta-W-Y)**
oxidation and strength, 131
- Cobalt systems (C-Co-Zr)**
phase studies, 244
- Cobalt systems (Co-O-W)**
phase studies, 129

- Cobalt systems (Co-TaC-WC)
(see Carbonyl 907)
- Cobalt systems (Co-WC)
(see Carbonyl 999)
- Composites
nondestructive testing, 263
- Compton spectrometers
use in nondestructive-assay of fuels, 70
- Coolants (organic)
corrosive and hydriding effects on
Zr alloys, 36
- Copper
annealing on U, 67
corrosion, 177-78, 235
corrosion of brazed joints using, 40
diffusion in U, 248-49
electrodeposition, 67, 141
electroplating with Cr-Re alloy, 198
explosive cladding of mild steel with
high-conductivity, 67
friction welding, 68
Mo deposition on substrates of, 140
solubility in molten Zn, 236
surface-recession rates, 125
ultrasonic testing, 69
use in diffusion bonding of Mg and U, 67
vapor deposition, 259
- Copper (Ir plated)
ductility, 141
- Copper (irradiated)
lattice parameters, 49
primary knock-on recoil spectrum, 192-93
recrystallization of cold-rolled poly-
crystalline, 116
swelling, 16
- Copper (Ta plated)
reduction, 141
- Copper alloys (Be-Cu)
fabrication, 24-25
mechanical properties, 219
phase studies, 92-93
production by splat cooling, 219
strength, 25
- Copper alloys (Co-Cu) (irradiated)
precipitation, 115-16
- Copper alloys (Cu-Ni)
use for brazing, 146
welding, 145
- Copper alloys (Cu-Ni-W)
properties, 126
- Copper alloys (Cu-Nb-Zr)
corrosion and H uptake, 229
- Copper alloys (Cu-Zr)
diffusion in, 132
- Copper braze
corrosion, 235
- Copper-braze bonds
corrosion, 40
ultrasonic testing, 69
- Copper single crystals (irradiated)
defect-cluster density relation to
critical-shear stress, 193
flow stress, 116
microstrain, 49
- Copper systems (B-Cu) (irradiated)
He precipitation in, 192
- Croloy 2 1/4
corrosion, 110, 176
- Croloy 9M
corrosion, 177
- D**
- D-11
erosion, 177
- D-14
coating with silicide and Ti, 140
corrosion, 40
- D-36
diffusion bonding, 64
- D-43
coating with silicide and Ti, 140
coatings for, protective, 106
corrosion, 40, 234
creep properties, 249-50
diffusion bonding, 64
evaporation loss, 124-25
properties, 127
welding, 142-44
- D-43 foils (coated)
properties, 38
- D-43Y
ductility, 245-46
welding, 143, 262
- Disil coatings
behavior, 231-32
- Disilicide coatings (V modified)
properties of, on C-129Y, 38
- Durak B coatings
behavior, 231-32
- Dysprosium
W solubility in, 247
- Dysprosium oxide
development of rod, 100
- Dysprosium sesquioxide absorber columns
development, 34
- Dysprosium sesquioxide dispersions Co-
Dy₂O₃ (stainless-steel(304) clad)
(irradiated)
performance, 32
- E**
- Eddy-current testing, 70, 148, 201
- EI-437B
creep rates, 39-40
- EI-851
creep rates, 39-40
- EI-869
creep rates, 39-40
- Electroplating, 66-67, 140-42, 198-99
- Elements
corrosion, 177-78
- Enrico Fermi Fast Breeder Reactor
radiation damage in graphite shield, 166
- Erbium
W solubility in, 247
- Ethane (1,1,1-trichloro-)
reaction with burning Pu, 6
- Europium
W solubility in, 247
- Europium alloys
phase studies, 226
- Europium dicarbide
heat of formation and vaporization, 101
- Europium molybdate
compatibility with Cr, Fe, and Ni, and
corrosion, 100
- Europium molybdate dispersions (Al-Eu
molybdate-Eu₂O₃)(Al clad)(irradiated)
dimensional stability, 101
- Europium sesquioxide dispersions (Al-Eu
molybdate-Eu₂O₃)(Al clad)(irradiated)
dimensional stability, 101
- Europium sesquioxide dispersions (Eu₂O₃-
stainless steel)(irradiated)
properties, 228
- Europium sesquioxide dispersions (Eu₂O₃-
stainless steel)(stainless-steel clad)
(irradiated)
examination, 171-72
- Europium sesquioxide systems (Al-Eu₂O₃)
fabrication, 100-1
- Explosive forming, 67, 260
- F**
- F-48
erosion, 177
- Fabrication
special techniques, 63-71, 138-50, 197-
202, 255-65
- Ferrovac E
stress-rupture properties, 250-51
- Fertile materials, 1-19, 73-90, 151-65,
203-16
- Films (thin)
deposition-rate monitor, 259
- Fission-gas bubbles
migration, 17, 87
- Fissionium alloys (fissionium-Pu-U)
compatibility with stainless steel, 5
development, 6
phase studies, 74-75
solidus temperatures, 5
- Fissionium alloys (fissionium-Pu-U)(irradiated)
properties, 205-6
- Fissionium alloys (fissionium-Pu-U)(clad)
(irradiated)
burnup, 74
- Fissionium alloys (fissionium-Pu-U)(irradiated)
properties, 205-6
- Fluorides (liquid)
corrosive effects, 110, 236
- Foils (brazing)
nondestructive testing, 70
- Forming (explosive), 67, 260
- FS-80
evaporation loss, 124-25
- FS-85
corrosion, 40, 108, 234
creep properties, 55, 249-50
evaporation loss, 124-25
Pt coatings for, 233
welding, 143-44
- FS-85 couples (FS-85-TZM)
diffusion behavior in Pt-coated, 233
- Fuel cladding materials
(see Cladding materials)
- Fuel materials, 1-19, 73-90, 151-65, 203-16
(see also Nonfuel materials (irradiated))
- Fuel particles (ceramic coated)
development, 209-10
- Fuel particles (ceramic coated)(irradiated)
fission-product release, 10
- Fuel particles (coated)
development, 156-57
- Fuel particles (coated)(irradiated)
evaluation, 10
performance, 81, 210
- Fuel particles (PyC coated)(irradiated)
performance, 10, 210
- Fuel pins (irradiated)
thermal properties, detection of changes
in, 200-1
- Fuel-reprocessing solutions
corrosive effects, 178
- Fuel rods (stainless-steel(304) clad)
(irradiated)
properties, 189
- Fuel wafers
fabrication of glass-bonded, 11
- Fuels
billet casting for NPR, 63
corrosion, 15
H release during SNAP 10A/2 reactor
destructive test, 28
nondestructive assay, 70
production for production reactors, 63
reactions with water, 161
- Fuels (bonded)
ultrasonic testing, 69

Fuels (cermet)
development, 79

Fuels (cermet)(irradiated)
burnup, 79

Fuels (intermetallic compound), 12-14

Fuels (irradiated)
inert-gas migration in, 163
nondestructive assay, 70
properties, 15-17
reactions with water, 14-15
stresses caused by swelling, 162

Fuels (particulate)
canning of, 257-58

Fuels (stainless-steel(304) clad)
ultrasonic testing, 69

Fused salts
corrosive effects, 107-10

Fused slurry silicide coatings
development and evaluation, 106

G

Gadolinium
W solubility in, 247

Gadolinium intermetallic compounds (GdBe₁₃)
properties, 27

Gallium
solubility in molten Zn, 236

Gas bubbles (fission-)
migration, 17, 87

Germanium
corrosion, 177-78
solubility in molten Zn, 236

Glass dispersions (B₂C-glass)(stainless-steel(321) clad)(irradiated)
performance, 32

Gold
corrosion, 177-78
solubility in molten Zn, 236

Gold (irradiated)
primary knock-on recoil spectrum, 192-93

Gold alloys (Au-Mo-Ni)
use for brazing, 146

Gold alloys (Au-Ni)
use in brazing of Be, 168

Gold alloys (Au-Th)(Zr clad)
fabrication, 257

Grade 7178
corrosion, 40

Graphite
(see also Carbon)
Ba diffusion in, 91
brazing, 146
Ce diffusion in, 91
compaction, 142
corrosion, 21-22, 40
gas-pressure bonding, 200
oxidation, POCl₃ effects on, 20
plastic strain, thermal induction of, 166
properties of compacted, 91
reaction with H₂, 91
Sr diffusion in, 91
thermal expansion, 22
U diffusion in, 248

Graphite (ATJ)
tensile properties, 121

Graphite (irradiated)
compatibility with irradiated BeO, 217
contraction, 20, 217-18
creep properties, 91-92, 166-67
damage, 166
dilation, liquid-Na, 22
dimensional changes, 91-92
elastic modulus, 167
oxidation, 166

properties of heat-treated, 217-18

Graphite (pyrolytic)
formation, 199
tensile properties, 121

Graphite (pyrolytic)(irradiated)
thermal diffusivity, annealing effects on, 20-21

Graphite mixtures (B₄C-graphite)
preparation, 228

Graphite systems (graphite-ThC₂)
eutectic, 12

Graphite systems (graphite-UO₂)
melting, 197

H

Hafnium
corrosion, 99-100
effects on Mo recrystallization temperature, 182
effects on W strength, 182
mechanical properties, 32
phase diagrams, 186
properties, O effects on, 171
residual stresses, annealing effects on, 226

Hafnium (irradiated)
mechanical properties, 32

Hafnium alloy coatings (Hf-Ir)
for Ta, 38

Hafnium alloy coatings (Hf-Mo-Ta)
oxidation, 106

Hafnium alloy coatings (Hf-Ta)
oxidation, 106
for Ta, 38
for Ta alloys, 233

Hafnium alloys (Al-Hf-Nb)
oxidation, 100

Hafnium alloys (Al-Hf-Ta)
oxidation, 100

Hafnium alloys (Cr-Hf-Ta)
oxidation, 100

Hafnium alloys (Hf-Nb-W)
(see C-129)

Hafnium alloys (Hf-Nb-W-Y)
(see C-129Y)

Hafnium alloys (Hf-Re-Ta)
phase studies, 129

Hafnium alloys (Hf-Ta)
phase studies, 226

Hafnium alloys (Hf-Ta-W)
(see also T-111)
cavitation, 105
corrosion, 108
phase studies, 247

Hafnium alloys (Hf-W)
mechanical properties of carbide-strengthened, 247

Hafnium alloys (Hf-Zr)
H terminal solubility in, 28-29

Hafnium boride systems
oxidation, 132

Hafnium carbide
corrosion, 110
tensile properties, 172

Hafnium carbide solid solutions
preparation and properties, 101

Hafnium diboride
hardness, 251

Hafnium dioxide
corrosion, 40
use to protect thermocouples, 105

Hafnium dioxide coatings
for W, 38

Hafnium dioxide powders (HfO₂-MgO)
sintering, 59

Hafnium dioxide solid solutions (HfO₂-ZrO₂)
thermal expansion, 172

Hafnium dioxide systems (Al-HfO₂)
fabrication, 100

Hafnium intermetallic compounds (HfBe₁₃)
oxidation, 27

Hafnium monocarbide systems (C-HfC)
tensile properties, 101-2

Hafnium monocarbide systems (HfC-Ta)
preparation, 101

Hafnium systems (C-Hf)
phase studies, 101

Hafnium systems (C-Hf-Ta)
phase studies, 32

Hafnium systems (C-Hf-Ta-W)
(see T-222)

Hafnium systems (Hf-H-Zr)
phase studies, 29

Hafnium systems (Hf-Mo-Nb-W)
(see SU-16)

Hafnium systems (Hf-O)
hardness and phase studies, 99

Hafnium systems (Hf-SiC)
oxidation, 132

Hastelloy C
nitriding, 175
oxidation, 104

Hastelloy C (irradiated)
properties, 192

Hastelloy F
microstructural evaluation for cladding
use, 51
tensile properties, temperature effects on, 180

Hastelloy N
corrosion, 177, 230
oxidation, 104
properties, 124
thermal conductivity, 245

Hastelloy N (irradiated)
mechanical properties, 45-46, 124, 191
rupture life, 240

Hastelloy R-235
properties, 124

Hastelloy R-235 (irradiated)
mechanical properties, 113, 124

Hastelloy X
compatibility with Pu_{0.2}C-U_{0.8}C system, 8
corrosion, 37, 104
creep-rupture properties, 117, 180
microstructural evaluation for cladding
use, 51
nitriding, 175
oxidation, 230
properties, 124
reaction with PuC-UC system, 159
strength, 250
tensile properties, 54-55, 180
thermal conductivity, 245

Hastelloy X (irradiated)
mechanical properties, 124

Hastelloy X-280
oxidation, 104

Hastelloy X-280 (irradiated)
mechanical properties, 46, 113

Haynes 25
oxidation, 104
welding, 145

High-energy-release-rate (HERR) bonding,
68, 147

Holmium
W solubility in, 247

Holmium tetraboride
hardness, 251

Honeycombs
ultrasonic testing, 263

Hydrides (solid), 27-30, 96-98

- Hydrocarbons (fluorinated)
corrosion, 36
- Hydrogen
reaction with graphite, 91
- Hydrogen systems
(see specific hydrides)
- Hydrogen systems (Hf-H-Zr)
phase studies, 29
- Hydrogen systems (H-Nb)
phase studies, 29
tensile properties, strain-rate effects
on, 56
- Hydrogen systems (H-V)
ductility, 56
- I
- Incoloy 800
corrosion, 37, 104
microstructural evaluation for cladding
use, 51
nitriding, 175
oxidation, 174
tensile properties, temperature effects
on, 180
welding, 145-46
- Incoloy 800 (irradiated)
mechanical properties, 46, 191
- Incoloy 800 (modified)
microstructural evaluation for cladding
use, 51
- Incoloy 800 tubes
strength, 117
- Incoloy 801
microstructural evaluation for cladding
use, 51
tensile properties, temperature effects
on, 180
- Incoloy 804
microstructural evaluation for cladding
use, 51
- Incoloy 825
corrosion, 37, 104
microstructural evaluation for cladding
use, 51
tensile properties, temperature effects
on, 180
- Inconel
compatibility with Th, 9
corrosion, 37
joining to Zircaloy, 68
stainless-steel (304) corrosion-product
deposition on, 36
- Inconel transition joints (Inconel-Zircaloy-
2)(irradiated)
mechanical properties, 240
properties, 260
- Inconel 600
corrosion, 37, 104, 230
oxidation, 104
nitriding, 175
welding, 145
- Inconel 600 (irradiated)
mechanical properties, 46, 113
- Inconel 625
corrosion, 37, 104
microstructural evaluation for cladding
use, 51
oxidation, 104
tensile properties, temperature effects
on, 180
thermal conductivity, 245
welding, 145-46
- Inconel 625 (irradiated)
mechanical properties, 113
tensile properties, 46
- Inconel 702
thermal conductivity, 245
- Inconel 702 (irradiated)
mechanical properties, 113
- Inconel 713C (irradiated)
properties, 192
- Inconel 718
microstructural evaluation for cladding
use, 51
tensile properties, temperature effects
on, 180
- Inconel X-750 (irradiated)
properties, 192
- Indium
corrosion, 177-78
solubility in molten Zn, 236
- Indium alloys (Cd-In-Ag)(plated)(irradiated)
mechanical properties, 32
- Indium alloys (Eu-In)
phase studies, 226
- Indium alloys (In-Th)
tensile properties, 9
- Indium alloys (In-Zr)
H terminal solubility in, 28
- INOR-8
braze and welding, 146
- INOR-8 (irradiated)
rupture properties, 113
- Iridium
electrodeposition of, 141
phase diagrams, 186
- Iridium alloy coatings
for Ta, 38
for W, 233
- Iridium alloys (Ir-Nb)
mechanical properties, 127
- Iridium alloys (Ir-W)
casting, 255
- Iridium coatings (Ir-Rh)
for W, 233
- Iridium intermetallic compounds (Pu_3Ir)
physical properties, 153
- Iron
compatibility with Eu molybdate, 100
corrosion, 177-78
diffusion in Be, 248
diffusion in U, 248-49
electrodeposition on Be and Zn-plated Be,
67
fatigue-limit behavior, 181
oxidation, 37, 104
phase diagrams, 186
reaction with steam, 42-43
solid solubility in U, 203
solubility in molten Li, 107
solubility in molten Zn, 236
surface-recession rates, 125
- Iron (Armco)
stress-rupture properties, 250-51
- Iron (Ferrovac E)(irradiated)
tensile properties, 241
- Iron (irradiated)
lattice parameters, 49
mechanical properties, 241
microstructure, 241
nitride precipitation in, 241
primary knock-on recoil spectrum, 192-
93
- Iron alloy tubes (Al-Fe-U)(Zircaloy clad)
(irradiated)
swelling, 2-4
- Iron alloys
brittleness of body-centered cubic, 50
corrosion, 177-78
mechanical properties, 54, 117-18
metallurgy, 50-51
- Iron alloys (Al-Cr-Fe-Y)
(see also 1541 alloy)
oxidation, 79
properties, 244-45
- Iron alloys (Al-Cr-Fe-Y)(irradiated)
ductile-brittle transition temperature, 115
hardness, 115
tensile properties, 190
- Iron alloys (Al-Fe-U)
precipitate solution in, 73
UAl₃ precipitates in, 151-52
- Iron alloys (Be-Fe)
mechanical properties, 219
phase studies, 92-93
production by splat cooling, 219
- Iron alloys (Ce-Fe-Pu)
phase studies, 77
- Iron alloys (Cr-Co-Fe-Ni-W)
(see L-605)
- Iron alloys (Cr-Fe)(irradiated)
¹³⁵Xe release during heating, 190
- Iron alloys (Cr-Fe-Ni)
(see Alloy 718)
- Iron alloys (Cr-Fe-Ni-Nb)(irradiated)
ductility, B effects on, 112
- Iron alloys (Cr-Fe-Ni-Ti)(irradiated)
ductility, B effects on, 112
- Iron alloys (Cr-Fe-Sn-Zr)
corrosion and mechanical properties, 103
- Iron alloys (Cr-Fe-Zr)
corrosion and mechanical properties, 103
- Iron alloys (Co-Fe-Ni)
corrosion, 235
- Iron alloys (Fe-Pu-U)
properties, 153-54
- Iron alloys (Fe-U)
transformation, 1
- Iron cermets (Fe-UO₂)
development, 9, 79
- Iron dispersions
cladding materials for, 79
- Iron dispersions (Fe-UO₂)(Al-Cr-Fe-Y
alloy clad)
preparation, 79-80
- Iron fused slurry coatings
development and evaluation, 106
- Iron system tubes (Al-Fe-Si-U)(Zircaloy
clad)(irradiated)
swelling, 2-4
- Iron systems (Al-Fe-Mo-Si-U)
hardness, 2
- Iron systems (Al-Fe-Ni-Si)
corrosion, 103
- Iron systems (C-Cr-Co-Fe-Ni-W)
(see Star J)
- Iron systems (C-Cr-Fe-Ni-N)
stress-corrosion cracking, 104
- Iron systems (C-Fe-Nb)
phase studies, 246
- Iron systems (Fe-SiC)
oxidation, 132
- Iron systems (Fe-UC)
reaction with stainless steel (316), 159
- J
- Journal bearing materials
corrosion, 40
- K
- KB01
corrosion, 40
- Kennametal K-7178 couples
corrosion, 108
- L
- L-605
embrittlement, 131

- tensile properties, 245
- Lanthanum**
- electrodeposition on Pt, 198
 - phase diagrams, 186
 - solubility in molten Zn, 236
 - W solubility in, 247
- Lanthanum alloys (La-Mo)**
- fabrication, 51
- Lanthanum alloys (La-Nb)**
- mechanical properties, 127
- Lanthanum hexaboride**
- hardness, 251
- Lead**
- solubility in molten Zn, 236
- Lead (molten)**
- corrosive effects, 110, 178, 236
- Lead alloys (Bi-Pb)(molten)**
- wetting effects, 178
- Lead alloys (Pb-Zr)**
- H terminal solubility in, 28
- Lithium**
- solubility in molten Zn, 236
- Lithium (molten)**
- corrosive effects, 107-9, 234-35
- Lithium fluoride mixtures (LiF-MgF₂) (molten)**
- corrosive effects, 236
- Lithium fluoride systems (BeF₂-LiF-UF₄-ZrF₄)(molten)**
- corrosive effects, 110
- Lithium hydride**
- casting, 97
 - thermodynamic properties, 170
- Lithium hydride (molten)**
- corrosive effects, 41
- Lithium systems (Li-Mg-Si)**
- casting, 256
- Lucalox**
- corrosion, 40
 - sealing to Nb, 59
- Lutetium**
- W solubility in, 247
- M**
- Magnesium**
- cavitation during creep, 123
 - compatibility studies, 37
 - corrosion, 177-78
 - diffusion bonding to U using Cu and Ni, 67
 - Pu diffusion in, 188
 - solubility in molten Zn, 236
- Magnesium alloys**
- Pu diffusion in, 188
- Magnesium alloys (Al-Mg-Zr)**
- creep properties, 251
- Magnesium alloys (Cd-Mg)(molten)**
- corrosive effects, 178-79
- Magnesium alloys (Cd-Mg-Zn)(molten)**
- corrosive effects, 178-79
- Magnesium alloys (irradiated)**
- damage, 115
- Magnesium alloys (Mg-Zr)**
- creep properties, heat-treatment effects on, 183
- Magnesium fluoride mixtures (LiF-MgF₂) (molten)**
- corrosive effects, 236
- Magnesium fluoride mixtures (MgF₂-NaF) (molten)**
- corrosive effects, 236
- Magnesium oxide**
- evaporation rates, 58
 - strength, 58-59, 193
- Magnesium oxide coatings**
- for W, 38, 105
- Magnesium oxide powders**
- coating with Mo and W, 139-40
 - compaction, 142
 - sintering, HfO₂ effects on, 59
- Magnesium oxide systems (BeO-MgO-SiC)**
- properties, 223
- Magnesium solutions (Mg-U-Zn)**
- corrosive effects, 178
- Magnesium systems (Li-Mg-Si)**
- casting, 256
- Magnox**
- compatibility studies, 37
- Magnox Al-80**
- creep deformation, 243
- Manganese**
- corrosion, 177-78
 - diffusion in U, 248-49
 - phase diagrams, 186
 - solubility in molten Zn, 236
- Manganese alloys (U-UCO₂-UMn₂)**
- phase studies, 152-53
- Manganese disilicide**
- thermal dilation, 106
- Manganese fused slurry coatings**
- development and evaluation, 106
- Manganese intermetallic compounds (U₂Mn)**
- solid solubility, 153
- Melting, 63-64, 138, 197-98, 255-57**
- Mercury**
- corrosive effects, 39, 177-78, 235-36
- Metal carbides**
- casting, 101
- Metal foils (refractory)(coated)**
- properties, 38
- Metal systems (C-metal)**
- casting and melting, 256
- Metals**
- casting of reactive, 256
 - corrosion, 177-78
 - diffusion in, 131-32
 - eddy-current testing, 201
 - electrodeposition on Pt, 198-99
 - explosive working, 67
 - ion plating of, 199-200
 - joining to ceramics, 146-47
 - melting of reactive, 256
 - reactions with water, 41-43, 161, 237-39
 - solubility in molten Zn, 236
- Metals (alkali)(liquid)**
- corrosive effects, 107
- Metals (hexagonal)**
- base pole figures of close-packed, 49-50
- Metals (irradiated)**
- properties, 115, 192
- Metals (molten)**
- corrosive effects, 39-41, 107-10, 178
 - reactions with water, 110-11
 - solidification, 198
- Metals (rare earth)**
- effects on Zr properties, 183
 - Ta solubility in, 185
 - W solubility in, 247
- Metals (refractory)**
- C solubility in, 51
 - chemical plating of, 199
 - coatings for, 38-39, 105-6, 175, 199
 - compatibility with PuO₂-UO₂ system, 78
 - corrosion, 37-39, 107, 230-33
 - diffusion bonding, 64
 - diffusion in, 248
 - ductile-brittle transition in body-centered cubic, 51
 - mechanical properties, 55-56, 118, 120, 249-50
 - metallurgy, 51
 - properties, 175
 - reactions with PuC-UC system, 78
 - reactions with steam, 41-42
 - thermal properties, 184
- Metals (refractory)(coated)**
- properties, 175
- Metals (refractory)(irradiated)**
- properties, 115, 241-43
- Moderator materials, 20-31, 91-98, 166-70, 217-25**
- Molybdenum**
- C solubility in, 51
 - chemical plating of, 199, 258-59
 - chemical plating of MoSi₂ on, 140
 - compatibility with Pu_{0.2}C-U_{0.8}C system, 8
 - compatibility with PuO₂-UO₂ system, 78
 - compatibility with UC-ZrC system, 159
 - compatibility with UP, 212
 - corrosion, 37-38, 40, 107, 177-78, 230, 235-36
 - creep properties, 120
 - creep-rupture properties, 249
 - deposition on Cu substrates, 140
 - diffusion in Cr, 132
 - electrodeposition of, 141
 - electrodeposition of Cr on, 67
 - electrodeposition of Cr-Re alloy on, 198
 - electrodeposition of Ni on, 67
 - electrodeposition of Re on, 141, 198
 - fabrication, La addition effects on, 51
 - grain size, annealing effects on, 246
 - hardness, zone-refining effects on, 246
 - mechanical properties, 182
 - melting point, annealing effects on, 246
 - metallurgy, 51
 - oxide-dispersion hardening, 51
 - phase diagrams, 186
 - properties, 175
 - properties, hot plastic deformation effects on, 255
 - reaction with PuC-UC system, 159
 - reaction with steam, 42
 - recrystallization, 181-82, 246
 - Re diffusion in, 248
 - siliconizing of, 199
 - sintering effects on sprayed, 125
 - solubility in molten K, 107
 - solubility in molten Zn, 236
 - structure, hot plastic deformation effects on, 255
 - surface-recession rates, 125
 - thermal conductivity, 125, 185
 - W diffusion in, 185, 248
 - U diffusion in, 248
 - use for coating nonmetallic powders, 139-40
 - vapor deposition, 259
 - vapor pressure, 185-86
 - welding, 185, 261-62
- Molybdenum (irradiated)**
- properties, 49, 116-17, 242
- Molybdenum alloy coatings (Hf-Mo-Ta)**
- oxidation, 106
- Molybdenum alloy couples (Mo-Ti)**
- corrosion, 108
- Molybdenum alloy couples (Mo-Ti-Zr)**
- corrosion, 108
- Molybdenum alloy films (Mo-U)(irradiated)**
- fission-fragment tracks, 17
- Molybdenum alloy rod (Mo-Re-W)**
- fabrication, 256
- Molybdenum alloy tubes (Mo-U)(Zircaloy clad)(irradiated)**
- swelling, 3-4
- Molybdenum alloys**
- cavitation, 105
 - metallurgy, 51
 - PFR-6 coating development for, 106
 - Pt coatings for, 233

- properties, 175
thermal properties, 184
- Molybdenum alloys (Au-Mo-Ni)
use for brazing, 146
- Molybdenum alloys (Al-Mo-Ti-V)
properties, 183
- Molybdenum alloys (Al-Mo-U)(Al clad)
(irradiated)
properties, 203-4
- Molybdenum alloys (Cr-Co-Mo-Ni)
(see Udimet 700)
- Molybdenum alloys (high strength)
oxidation, 125
- Molybdenum alloys (La-Mo)
fabrication, 51
- Molybdenum alloys (Mo-Nb)
binary interdiffusion in, 132
corrosion, 230-31
high-temperature properties, 185
mechanical properties, 52, 127
- Molybdenum alloys (Mo-Nb-Ta-Zr)
(see SCB-61)
- Molybdenum alloys (Mo-Nb-Ti-Zr)
(see PWC-533)
- Molybdenum alloys (Mo-Nb-W-Zr)
(see F-48)
- Molybdenum alloys (Mo-Nb-V-Zr)
(see B-66)
- Molybdenum alloys (Mo-Os-W)
phase studies, 128-29
- Molybdenum alloys (Mo-Pu-U)
fabrication, 138
thermal expansion, 206
- Molybdenum alloys (Mo-Re)
creep-rupture properties, 249
- Molybdenum alloys (Mo-Re-W)
creep-rupture properties, 120, 249
creep strength, 249
powder metallurgy, 256
- Molybdenum alloys (Mo-Ta-V)
phase studies, 129
- Molybdenum alloys (Mo-Ti)
binary interdiffusion in, 132
chemical plating of MoSi₂ on, 140
ductility, 125
erosion, 177
- Molybdenum alloys (Mo-Ti-V)
corrosion, 109
- Molybdenum alloys (Mo-Ti-Zr)
(see also TZM)
chemical plating of MoSi₂ on, 140
tensile properties, 118
- Molybdenum alloys (Mo-W)
corrosion, 178
mechanical properties, 249
reaction with UC, 84
- Molybdenum alloys (Mo-W-Zr)
phase studies, 129
- Molybdenum alloys (Mo-U)
specific heat, 204
transformation, 1
- Molybdenum alloys (Mo-U)(irradiated)
swelling, 152
- Molybdenum alloys (Mo-U)(stainless-steel
(304) clad)(irradiated)
behavior, 4-5
- Molybdenum alloys (Mo-Zr)
binary interdiffusion in, 132
- Molybdenum cermets
corrosion, 235
fracture, 79
- Molybdenum couples
corrosion, 108
- Molybdenum disilicide
chemical deposition of, 68, 140, 199
oxidation, 39, 251
thermal dilation, 106
- Molybdenum disilicide systems (MoSi₂-ZrB₂)
tensile properties, 121
- Molybdenum dispersions (Mo-Ni-ThO₂)
preparation, 51
- Molybdenum dispersions (Mo-UO₂)
UO₂ loss, heat effects on, 79
- Molybdenum fused slurry coatings
development and evaluation, 106
- Molybdenum powder
use as binder for ZrB₂, 172
- Molybdenum silicide (Mo₅Si₃)
thermal dilation, 106
- Molybdenum silicide systems
oxidation, 132
- Molybdenum system couples (Mo-Nb-Ti-WC)
corrosion, 108
- Molybdenum systems (Al-Fe-Mo-Si-U)
hardness, 2
- Molybdenum systems (C-Cr-Co-Mo-W-Y)
oxidation and strength, 131
- Molybdenum systems (C-Mo)
phase studies, 51
- Molybdenum systems (C-Mo-Nb-Ti-Zr)
fabrication and properties, 51
- Molybdenum systems (C-Mo-Ti-Zr)
(see also TZC)
creep-rupture properties, 118
fabrication, 51, 138
properties, 51
- Molybdenum systems (C-Mo-Zr)
phase studies, 50
- Molybdenum systems (Hf-Mo-Nb-W)
(see SU-16)
- Molybdenum systems (Mo-Nb-Si)
phase studies, 128
- Molybdenum systems (Mo-Si-U)
phase studies, 74
physical metallurgy, 1
properties, 1-2
- Molybdenum systems (Mo-Si-U)(irradiated)
swelling, 152
- Molybdenum systems (Mo-SiC)
oxidation, 132
- Molybdenum systems (Mo-TiC)
corrosion, 40
- Monel 400
corrosion, 230
- N**
- NaK
corrosive effects, 107-10, 176-77
- Nb 132M
creep properties, 181
- Neodymium
solubility in molten Zn, 236
W solubility in, 247
- Neptunium
diffusion in UO₂, 82, 248
- Neutron imaging, 263
- Neutron radiography, 70
- New Production Reactor
billet casting for fuel, 63
- Nichrome dispersions (Nichrome-PuO₂)
metallography, 208
- Nickel
chemical deposition, 66, 140
compatibility with Eu molybdate, 100
corrosion, 177-78
diffusion in U, 248-49
electrodeposition, 67, 141-42
mechanical properties of carbonyl-deposited and electrodeposited, 184
oxidation, 37
phase diagrams, 186
reaction with UN, 12-13
solubility in molten Li, 107
solubility in molten Zn, 236
tensile strength of electrodeposited, 67
use in diffusion bonding of Mg and U, 67
- Nickel (ThO₂ strengthened)
mechanical properties and metallurgy, 124
- Nickel alloys
(see also EI-437B, EI-869, Hastelloy, Incoloy, Inconel, and Nimonic)
corrosion, 104, 177-78
mechanical properties, 54-55, 117-18
metallurgy, 50-51
oxidation, 174
properties, 124
tensile properties, temperature effects on, 180
thermal conductivity, 245
ultrasonic testing for fatigue cracks, 200
welding, 145-46
- Nickel alloys (Be-Ni)
mechanical properties and production, 219
- Nickel alloys (Cr-Co-Fe-Ni-W)
(see L-605)
- Nickel alloys (Cr-Co-Mo-Ni)
(see Udimet 700)
- Nickel alloys (Cr-Co-Ni-W)
(see Haynes 25)
- Nickel alloys (Cr-Fe-Ni)
(see Alloy 718)
- Nickel alloys (Cr-Fe-Ni-Nb)(irradiated)
ductility, B effects on, 112
- Nickel alloys (Cr-Fe-Ni-Ti)(irradiated)
ductility, B effects on, 112
- Nickel alloys (Cr-Ni)
compatibility with PuO₂, 207
oxidation, 174
- Nickel alloys (Cr-Ni)(irradiated)
fission-fragment damage, 190
- Nickel alloys (Cr-Ni-Nb)(irradiated)
fission-fragment damage, 190
stress-rupture properties, annealing effects on, 191-92
- Nickel alloys (Co-Fe-Ni)
corrosion, 235
- Nickel alloys (Co-Ni)
tensile properties of electrodeposited, 66-67
- Nickel alloys (Cu-Ni)
use for brazing, 146
welding, 145
- Nickel alloys (Cu-Ni-W)
properties, 126
- Nickel alloys (Au-Mo-Ni)
use for brazing, 146
- Nickel alloys (Au-Ni)
use in brazing of Be, 168
- Nickel alloys (irradiated)
properties, 44-46, 113-15, 124, 240
- Nickel alloys (Ni-Nb)
mechanical properties and phase studies, 52
- Nickel alloys (Ni-Pd)
use for brazing, 146
- Nickel alloys (Ni-Ti)
corrosion of brazed joints using, 40
- Nickel alloys (Ni-W)
creep rates, 54
- Nickel alloys (TD)
diffusion bonding, 64
properties, 124
strength, 182
- Nickel alloys (TD)(irradiated)
mechanical properties, 124
- Nickel brazing alloys
corrosion, 40, 176

- Nickel cermets (Ni-UO₂)
development, 9
- Nickel coatings
electroplating, 259
- Nickel disilicide
thermal dilation, 106
- Nickel dispersions (Mo-Ni-ThO₂)
preparation, 51
mechanical properties, 51
oxidation, 37
preparation, 51
- Nickel single crystals (irradiated)
recovery, 116
- Nickel systems (Al-Fe-Ni-Si)
corrosion, 103
- Nickel systems (B-Cr-Ni)
(see CM 60)
- Nickel systems (B-Cr-Ni-Si)
(see CM 53)
- Nickel systems (B-Ni-Si)
(see CM 52)
- Nickel systems (C-Ni-U)
phase studies, 211
- Nickel systems (C-Cr-Co-Fe-Ni-W)
(see Star J)
- Nickel systems (C-Cr-Fe-Ni-N)
stress-corrosion cracking, 104
- Nimonic 80A springs (irradiated)
stress relaxation, 44-45
- Nimonic PE16 (irradiated)
tensile properties, 45, 113-14
- Niobium
coating UC₂ with, 200
coatings for, 199
compatibility with Pu_{0.2}C-U_{0.8}C system, 8
compatibility with PuO₂, 8
compatibility with PuO₂-UO₂ system, 78
compatibility with Th, 9
compatibility with UC-ZrC system, 159
compatibility with UP, 212
contamination by N, 184
corrosion, 37-38, 107-8, 177-78, 235
diffusion in U, 248-49
electrodeposition of, 141
high-temperature properties, Mo and Ti effects on, 185
impurity-phase identification, 53
mechanical properties, 52, 127, 182
melting point, annealing effects on, 246
metallurgy, 52-53
N solubility in, 126-27, 245
N sticking factor, 184-85
oxide-dispersion hardening, 51
phase diagrams, 186
properties, 51, 175
properties, hot plastic deformation effects on, 255
reaction with PuC-UC system, 159
reaction with steam, 42
relaxation peaks, internal-friction, 52
rolling, 257
sealing to Al₂O₃, 59
sealing to Lucalox, 59
solubility in molten Li, 107
solubility in molten Pu, 153
solubility in molten K, 107
solubility in molten Zn, 236
strain aging, 52, 184
strengthening, solid-solution, 245
structure, hot plastic deformation effects on, 255
tensile properties, 55-56
U diffusion in, 248
vapor deposition, 259
- Niobium (Ir plated)
brittleness and pinholes, 141
- Niobium (irradiated)
annealing, 116
corrosion, 174
He production, 192
H production, 192
interstitials, 116
vacancies, 116
- Niobium alloy couples (Nb-Zr)
corrosion, 109
- Niobium alloy couples (Nb-Zr)(carburized)
corrosion, 108
- Niobium alloy tubing (Nb-Zr)
crystal structure, 49
- Niobium alloys
(see also As-30, D-36, and Nb 132M)
cavitation, 105
Cr-Si-Ti coating for, application process for, 106
coatings for, 106, 199
corrosion, 233-34
impurity-phase identification, 53
mechanical properties, 52
metallurgy, 52-53
properties, 175
reaction with UC, 84
reaction with UN, 84
thermal properties, 184
welding, 142-44, 262
- Niobium alloys (Al-Hf-Nb)
oxidation, 100
- Niobium alloys (Al-Nb-Ta-Ti)
crack growth, 230
welding, 145
- Niobium alloys (Cr-Fe-Ni-Nb)(irradiated)
ductility, B effects on, 112
- Niobium alloys (Cr-Ni-Nb)(irradiated)
fission-fragment damage, 190
stress-rupture properties, annealing effects on, 191-92
- Niobium alloys (Cr-Nb)
mechanical properties, 127
- Niobium alloys (Cr-Nb-U)
transformation, 1
- Niobium alloys (Cu-Nb-Zr)
corrosion and H uptake, 229
- Niobium alloys (Hf-Nb-W)
(see also C-129)
cavitation, 105
- Niobium alloys (Hf-Nb-W-Y)
(see C-129Y)
- Niobium alloys (high-strength)
oxidation, 125
- Niobium alloys (Ir-Nb)
mechanical properties, 127
- Niobium alloys (La-Nb)
mechanical properties, 127
- Niobium alloys (Mo-Nb)
binary interdiffusion in, 132
corrosion, 230-31
high-temperature properties, 185
mechanical properties, 52, 127
- Niobium alloys (Mo-Nb-Ta-Zr)
(see SCB-61)
- Niobium alloys (Mo-Nb-Ti-Zr)
(see PWC-533)
- Niobium alloys (Mo-Nb-W-Zr)
(see F-48)
- Niobium alloys (Mo-Nb-V-Zr)
(see B-66)
- Niobium alloys (Ni-Nb)
mechanical properties and phase studies, 52
- Niobium alloys (Nb-refractory metal)
treatment, 245
- Niobium alloys (Nb-Re)
mechanical properties, 127
- Niobium alloys (Nb-Ta)
corrosion, 230-31
mechanical properties, 127
- Niobium alloys (Nb-Ta-Ti-V)
creep resistance, 53
- Niobium alloys (Nb-Ta-W)
(see SCB-291)
corrosion, 233-34
- Niobium alloys (Nb-Ta-W-Zr)
(see FS-85)
- Niobium alloys (Nb-Ta-V)
phase studies, 129
- Niobium alloys (Nb-Ta-Zr)
removal of N and O, 63
- Niobium alloys (Nb-Sn)
phase studies, 52
- Niobium alloys (Nb-Sn-Zr)
corrosion, 36
tempering, 50
- Niobium alloys (Nb-Sn-Zr)(irradiated)
corrosion, 229, 240
mechanical properties, 240
oxidation, 229
- Niobium alloys (Nb-Ti)
binary interdiffusion in, 132
coating with PWK-5, 199
corrosion, 230-31
high-temperature properties, 185
- Niobium alloys (Nb-Ti-V)
annealing, 53
evaluation, 138
evaporation, 128
preparation, 138
- Niobium alloys (Nb-Ti-Zr)
annealing, 53
- Niobium alloys (Nb-W)
mechanical properties, 52, 127, 247
reaction with UC, 84
reaction with UN, 84
- Niobium alloys (Nb-W-Y-Zr)
(see AS-55 and D-43Y)
- Niobium alloys (Nb-W-Zr)
(see Cb-752, D-43, and X-34)
- Niobium alloys (Nb-U)
specific heat, 205
transformation, 1
- Niobium alloys (Nb-U-Zr)
properties, 204
- Niobium alloys (Nb-U-Zr)(irradiated)
reaction with water, 161
- Niobium alloys (Nb-V)
(see also B33)
binary interdiffusion in, 132
corrosion, 108, 230-31
evaluation, 138
interdiffusion in, 188
mechanical properties, 52
preparation, 138
twinning, 52
welding, 144
- Niobium alloys (Nb-V-Zr)
aging, 127-28
hardness, 128
- Niobium alloys (Nb-Zn), 52
- Niobium alloys (Nb-Zr)
(see also D-11, D-14, PWC-11, PWC-33, and PWC-34)
age-hardening, 183-84
annealing, 53
binary interdiffusion in, 132
brazing, 146
carburization, 140
coating with FWK-5, 106, 199
compatibility with Be, 94
corrosion, 35-36, 40, 108, 110, 177, 229-31, 233-34
electrical resistivity, 127
fracture, 58
heat treatment, 183
H segregation, 124

- H terminal solubility in, 28
 ingot structure, O effects on, 256
 joining to Al_2O_3 , 146
 mechanical properties, 52, 127
 N removal, 63
 N solubility in, 126-27, 184
 oxidation, 37
 oxidative weight gain, 127
 O removal, 63
 properties, 57-58
 recrystallization temperature, 127
 strength, 35
 strengthening, 127
 stress-corrosion cracking, 235
 tempered structures, 244
 tensile properties, 118
 ZrH₃ reorientation, stress effects on, 124
- Niobium alloys (Nb-Zr)(irradiated)
 annealing, 114
 creep properties, 114
 impact properties, 46, 192
- Niobium carbide
 C diffusion in, 189
 corrosion, 107, 110
- Niobium carbide (Mo bonded)
 corrosion, 107-8
- Niobium carbide films (Nb_2C)
 growth on Nb-Zr alloys, 140
- Niobium carbide solid solutions (Hf carbide-Nb carbide)
 preparation and properties, 101
- Niobium diboride
 hardness, 251
- Niobium disilicide
 thermal dilation, 106
- Niobium disilicide systems (Nb-NbSi₂)
 intermediate-phase growth-rate kinetics, 105
- Niobium dispersions
 preparation, 80
- Niobium hydride
 tensile properties, 29-30
- Niobium monocarbide films
 growth on Nb-Zr alloys, 140
- Niobium monocarbide systems (NbC-UC)
 creep rate, 212
- Niobium nitride
 corrosion, 110
- Niobium oxide systems ($\text{Nb}_2\text{O}_5\text{-WO}_3$)
 phase studies, 133
- Niobium silicide (Nb_5Si_4)
 thermal dilation, 106
- Niobium single crystals
 mechanical properties, purification effects on, 182
- Niobium system couples (Mo-Nb-Ti-WC)
 corrosion, 108
- Niobium systems (B-Nb)
 mechanical properties, 127
- Niobium systems (C-Cr-Co-Nb-W-Y)
 oxidation and strength, 131
- Niobium systems (C-Fe-Nb)
 phase studies, 246
- Niobium systems (C-Mo-Nb-Ti-Zr)
 fabrication and properties, 51
- Niobium systems (C-Nb-W-Zr)
 cold working, 127
 corrosion, 233-34
- Niobium systems (C-Nb-Zr)
 corrosion, 108
 development, 62
 phase studies, 128
- Niobium systems (Hf-Mo-Nb-W)
 (see SU-16)
- Niobium systems (H-Nb)
 phase studies, 29
- tensile properties, strain-rate effects on, 56
- Niobium systems (Mo-Nb-Si)
 phase studies, 128
- Niobium systems (Nb-NbSi₂)
 intermediate-phase growth-rate kinetics, 105
- Niobium systems (Nb-Si)
 mechanical properties, 127
- Niobium systems (Nb-TiC)
 corrosion, 40
- Niobium tubing
 bonding to stainless steel (316), 198
- Nitride coatings (refractory)
 for Ta, 38
- Nitrides
 corrosion, 110
- Nitrogen systems (C-Cr-Fe-Ni-N)
 stress-corrosion cracking, 104
- Nitrogen systems (C-N-Pu)
 hardness, 8
- Nondestructive testing, 69-70, 147-48, 200-1, 263-64
- Nonfuel materials (irradiated)
 (see also Fuel materials)
 properties, 43-49, 111-17, 189-93, 239-43
- Novodur ABS plastic
 coating with Ni, 66
- Nuclear poisons, 32-34, 99-102, 171-73, 226-28
- O
- Organic coolants
 corrosive and hydriding effects on Zr alloys, 36
- Osmium
 phase diagrams, 186
- Osmium alloys (Mo-Os-W)
 phase studies, 128-29
- Osmium alloys (Os-W)
 casting, 255
- Osmium intermetallic compounds (Pu_3Os_2)
 physical properties, 153
- Oxides
 formation of dense, 193
- Oxides (PuO_2 containing)
 thermal expansion, 77
- Oxygen systems (C-O-Pu)
 phase studies, 207
- Oxygen systems (Co-O-W)
 phase studies, 129
- Oxygen systems (Hf-O)
 hardness and phase studies, 99
- Oxygen systems (O-Pu)
 phase studies, 8
- Oxygen systems (O-Na-U)
 phase studies, 5
- Oxygen systems (O-Zr)
 H terminal solubility in, 28
- P
- Palladium
 phase diagrams, 186
 solubility in molten Zn, 236
- Palladium alloys (Ni-Pd)
 use for brazing, 146
- Palladium alloys (Pd-Ti)
 corrosion, 105
- Palladium intermetallic compounds (PuPd)
 physical properties, 153
- Particulates
 (see also Powders)
 vibratory compaction, 64
- Penetrameter
 development, 148
- PFR-6 coating
 behavior, 231-32
 development for Mo alloys, 106
- PFR-32 coating
 behavior, 231-32
- Plastic (Novodur ABS)
 coating with Ni, 66
- Plastics
 corrosion, 36
- Plating (electro-), 66-67, 140-42, 198-99, 259-60
- Plating (nonelectrolytic chemical), 65-66, 139-40, 199-200, 258-59
- Platinum
 corrosion, 177-78
 electroplating with metals, 198-99
 phase diagrams, 186
 solubility in molten Zn, 236
- Platinum alloys (Pt-Ta)
 phase studies, 53
- Platinum alloys (Pt-Ti)
 binary interdiffusion in, 132
- Platinum coatings
 for Mo alloys and Nb alloys, 233
- Platinum intermetallic compounds (Pu_3Pt_2)
 physical properties, 153
- Plutonium
 annealing, 77
 creep properties, 7, 77
 diffusion in Mg, 188
 diffusion in Mg alloys, 188
 diffusion in UO_2 , 82, 248
 distribution in irradiated UO_2 , 11
 electrodeposition, 67
 electronic structure, 6
 etching, electrolytic, 77
 physical metallurgy, 77
 preparation of high-purity, 6
 reactions of burning, with solvents, 6
 solubility in molten Zn, 236
 solubility in PuN, 78
 solubility in Th, 79
 transformation, 6-7, 77, 206
- Plutonium (molten)
 Nb solubility in, 153
 Re solubility in, 5
 Ta solubility in, 5
- Plutonium alloys, 5-7, 205
- Plutonium alloys (Ce-Fe-Pu)
 phase studies, 77
- Plutonium alloys (Ce-Pu)(molten)
 viscosities, 6, 75, 77
- Plutonium alloys (fissium-Pu-U)
 compatibility with stainless steel, 5
 development, 6
 phase studies, 74-75
 solidus temperatures, 5
- Plutonium alloys (fissium-Pu-U)(irradiated)
 properties, 205-6
- Plutonium alloys (fissium-Pu-U)(clad)
 (irradiated)
 burnup, 74
- Plutonium alloys (fizzium-Pu-U)(irradiated)
 properties, 205-6
- Plutonium alloys (Fe-Pu-U)
 properties, 153-54
- Plutonium alloys (Mo-Pu-U)
 fabrication, 138
 thermal expansion, 206
- Plutonium alloys (Pu-Th-U)
 compatibility studies, 9
 development, 6
- Plutonium alloys (Pu-Ti-U)
 casting, 138
 compatibility with stainless steel, 5

- creep properties, 6
- ductility, 6
- mechanical properties, 75
- phase studies, 153
- solidus temperatures, 5
- thermal conductivity, 153
- thermal expansion, 5-6
- Plutonium alloys (Pu-Ti-U)(molten)
 - penetration of Ti-V alloy, 205
- Plutonium alloys (Pu-U)
 - development, 5-6
 - phase studies, 75
- Plutonium alloys (Pu-U-Zr)
 - casting, 138
 - compatibility with stainless steel (304), 5, 205
 - creep properties, 6
 - mechanical properties, 75
 - phase studies, 75, 153
 - solidus temperatures, 5
 - thermal conductivity, 153, 205
 - thermal expansion, 6
 - transformation, 75
- Plutonium alloys (Pu-U-Zr)(molten)
 - penetration of stainless steel (304), 205
- Plutonium alloys (Pu-Zr)
 - solidus temperatures, 75
- Plutonium aluminates (PuAlO₃)
 - crystal properties, 77-78
- Plutonium carbide systems (Pu carbide-Th carbide)(coated)(irradiated)
 - performance, 210
- Plutonium carbide systems (Pu carbide-U carbide)
 - compatibility studies, 8
 - fabrication, 212
 - synthesis, 212
 - thermal diffusivity, 7
- Plutonium carbide systems (Pu carbide-U carbide)(Nb clad)(irradiated)
 - properties, 160
- Plutonium carbide systems (Pu carbide-U carbide)(stainless-steel clad)(irradiated)
 - properties, 160
- Plutonium dioxide
 - compatibility with Cr-Ni alloy, 207
 - compatibility with Nb, 8
 - sintering, 78
- Plutonium dioxide dispersions (Al(1100)-PuO₂)
 - development, 9
- Plutonium dioxide dispersions (Nichrome-PuO₂)
 - metallography, 208
- Plutonium dioxide dispersions (Nb-PuO₂ particles (coated)-Zr)
 - preparation, 80
- Plutonium dioxide dispersions (Nb-(Pu-U)O₂ particles (coated)-Zr)
 - preparation, 80
- Plutonium dioxide dispersions (PuO₂-stainless steel(304L))
 - development, 9
- Plutonium dioxide dispersions (PuO₂-stainless steel(304L)(irradiated))
 - properties, 9
- Plutonium dioxide microspheres
 - preparation, 206-7
 - properties, 78, 207
- Plutonium dioxide mixtures (PuO₂-ThO₂)(irradiated)
 - fission-gas release, 78
- Plutonium dioxide mixtures (PuO₂-UO₂-ZrO₂)
 - preparation, 82
 - preparation, 80
- Plutonium dioxide particles
 - coating with metals, 80
- Plutonium dioxide pellets
 - preparation of glass-bonded, 8
- Plutonium dioxide system pellets (PuO₂-UO₂)
 - preparation of glass-bonded, 8
- Plutonium dioxide system pins (PuO₂-UO₂)(irradiated)
 - behavior, 8
- Plutonium dioxide systems (BeO-PuO₂-ThO₂)
 - phase studies, 8
- Plutonium dioxide systems (CaO-PuO₂-UO₂-ZrO₂)
 - melting points, 78
- Plutonium dioxide systems (PuO₂-UO₂)
 - compatibility with refractory metals, 78
 - density, 154
 - melting point, 154
 - particle-size-distribution determination, 8
 - preparation of spherical particles, 154
 - thermal expansion, 77
 - thermal gradient effects, 78
- Plutonium dioxide systems (PuO₂-UO₂)(self-irradiated)
 - Plutonium dioxide systems (PuO₂-UO₂-ZrO₂)
 - lattice parameters and stability, 154
 - Plutonium intermetallic compounds
 - physical properties, 153
 - Plutonium monocarbide
 - free energy of formation, 78
 - production, 154
 - solubility in ThC₂, 12
 - Plutonium monocarbide (clad)(irradiated)
 - fission-gas release, 79
 - Plutonium monocarbide (self-irradiated)
 - lattice parameters, 207
 - Plutonium monocarbide system particles (PuC-UC)
 - preparation, 7-8
 - vibratory compaction, 64
 - Plutonium monocarbide systems (PuC-UC)
 - preparation, 207
 - preparation of powders, 154-55
 - reactions with alloys, 159
 - reactions with metals, 78, 159
 - reduction in H₂, 161
 - sintering, 161
 - Plutonium monocarbide systems (PuC-UC)(Nimonic 90 clad)(irradiated)
 - damage, 86
 - Plutonium monocarbide systems (PuC-UC)stainless-steel clad)(irradiated)
 - fission-gas release, 212
 - Plutonium mononitride
 - analysis for O, 8
 - free energy of formation, 78
 - heat treatment effects, 78
 - impaction, 8
 - Pu solubility in, 78
 - thermal expansion, 8
 - thermodynamic properties, 207
 - vapor pressure, 8
 - Plutonium mononitride compacts (PuN-stainless steel)
 - Plutonium mononitride systems (PuN-UN)
 - preparation, 155, 207
 - Plutonium monophosphide
 - microhardness, 79
 - Plutonium monosulfide
 - melting point, 155
 - microhardness, 79
 - Plutonium monosulfide solid solutions (PuS-US)
 - preparation, 155, 207
- Plutonium monosulfide systems (PuS-US)
 - lattice constants and melting points, 207
- Plutonium monoxide systems (PuO-UO)
 - stability, 155
- Plutonium nitride systems (Pu nitride-U nitride)
 - properties, 8, 207
- Plutonium nitride systems (Pu nitride-U nitride)(irradiated), 207
- Plutonium sesquicarbide
 - free energy of formation, 78
 - reduction in H₂, 161
 - sintering, 161
- Plutonium sesquicarbide (self-irradiated)
 - lattice parameters, 207
- Plutonium sesquicarbide system (Pu₂C₃-UC)
 - reduction in H₂ and sintering, 161
- Plutonium sesquioxide
 - preparation, 8
- Plutonium sesquioxide
 - microhardness, 79
- Plutonium silicides (Pu₂Si₃)
 - physical properties, 153
- Plutonium single crystals
 - growth, 153
 - preparation, 6
- Plutonium systems (C-N-Pu)
 - hardness, 8
- Plutonium systems (C-O-Pu)
 - phase studies, 207
- Plutonium systems (C-Pu)
 - vapor pressure, 78
- Plutonium systems (C-Pu-Th)
 - phase studies, 12
- Plutonium systems (O-Pu)
 - phase studies, 8
- Poisons (nuclear), 32-34, 99-102, 171-73, 226-28
- Poisson's ratio
 - brittle materials, 121
- Potassium
 - corrosion, 177-78
 - phase diagrams, 186
- Potassium (molten)
 - corrosive effects, 40-41, 107, 109, 177, 234
- Potassium (vaporized)
 - corrosive effects of wet, 108
- Potassium alloys (NaK)
 - corrosive effects, 107-10, 176-77
- Potassium chloride (irradiated)
 - rare-gas diffusion in, 163
- Potassium fluoride (irradiated)
 - rare-gas diffusion in, 163
- Potassium iodide (irradiated)
 - rare-gas diffusion in, 163
- Powders
 - (see also Particles)
 - pressing, hot isostatic, 142
- Powders (ceramic)
 - fabrication, 193
- Powders (irradiated)
 - fission-gas release, 162
- Powders (nonmetallic)
 - coating with Mo and W, 139-40
- Praseodymium
 - solubility in molten Zn, 236
 - W solubility in, 247
- Pressure vessels
 - fracture mechanics of steel, 181
- Production reactors
 - fuel production for, 63
- Protactinium
 - diffusion in UO₂, 82, 248
 - electrodeposition on Pt, 198-99
- PWC-11
 - corrosion, 40, 108

- mechanical properties, 52-53
oxidative weight gain, 127
- PWC-33
corrosion, 108
mechanical properties, 52-53
- PWC-34
mechanical properties, 52-53
- PWC-533
corrosion, 40-41
PWK-1 coatings
use on refractories, 199
- PWK-5 coatings
use on refractories, 106, 199
- R**
- Radiation detectors
use in nondestructive assay of fuels, 70
- Radiation effects
fuel materials, 15-17, 87-88, 162-63
nonfuel materials, 43-49, 111-17, 189-93
- Radiography, 70
- Rare-earth hydrides
properties and structure, 224-25
- Reactors (boiling water)
corrosion suppression using NH_3 , 230
- Reactors (Enrico Fermi Fast Breeder)
radiation damage in graphite shield, 166
- Reactors (production)
fuel production for, 63
- Reactors (SNAP-8)
corrosion in, 176-77
- Reactors (SNAP-10A/2)
H release from fuel during destructive test, 28
- Reactors (sodium-graphite)
welding in maintenance of, 68
- Refractories
(see Alloys (refractory metal) and Metals (refractory))
- Rene' 41
coating of, 257
erosion, 177
properties, 124
- Rene' 41 (irradiated)
mechanical properties, 124
- Rene' 62
tensile properties, temperature effects on, 180
- Reprocessing solutions
corrosive effects, 178
- Rhenium
C solubility in, 51
chemical plating using, 140, 258
compatibility with UC-ZrC system, 159
corrosion, 247
creep-rupture properties, 249
diffusion in Mo, 248
electrodeposition of, 141, 198
mechanical properties, 247
phase diagrams, 186
physical metallurgy, 247
physical properties, 247
reaction with steam, 42, 231
solubility in molten Pu, 5
surface-recession rates, 125
- Rhenium (irradiated)
defects, 49
- Rhenium alloy rod (Mo-Re-W)
fabrication, 256
- Rhenium alloy sheet (Re-W)
Young's modulus, static, 118, 120
- Rhenium alloy thermocouples (Re-W vs. W)
sheathing of, 105
- Rhenium alloy tubing (Re-W)
fabrication, 63, 256
- Rhenium alloys, 247
- Rhenium alloys (Cr-Re)
electrodeposition on Cr, Cu, Mo, and W, 198
notch impact properties, 250
- Rhenium alloys (Hf-Re-Ta)
phase studies, 129
- Rhenium alloys (Mo-Re)
creep-rupture properties, 249
- Rhenium alloys (Mo-Re-W)
creep-rupture properties, 120, 249
creep strength, 249
powder metallurgy, 256
- Rhenium alloys (Nb-Re)
mechanical properties, 127
- Rhenium alloys (Re-W)
age hardening, 186
casting, 255
chemical plating using, 199
corrosion, 108
creep properties, 120, 181, 249
creep-rupture properties, 120
deposition of, 65, 140
fabrication, 256
powder metallurgy, 256
recrystallization temperature, ThO_2 effects on, 247
vapor deposition, 258
welding, 143
- Rhenium disilicide
oxidation and thermal dilation, 106
- Rhenium system sheet (Re- ThO_2 -W)
fabricability and properties, 247
- Rhodium
phase diagrams, 186
solubility in molten Zn, 236
- Rhodium coatings (Ir-Rh)
for W, 233
- Rhodium intermetallic compounds (Pu_3Rh_2)
physical properties, 153
- Rubidium
phase diagrams, 186
- Ruthenium
phase diagrams, 186
solubility in molten Zn, 236
- Ruthenium intermetallic compounds (Pu_3Ru_3)
physical properties, 153
- S**
- Salts (fused)
corrosive effects, 107-10, 236
- Samarium
W solubility in, 247
- SAP
(see Aluminum (SAP))
- Scandium
phase diagrams, 186
W solubility in, 247
- Scandium alloys (Sc-Y) (hydrided)
phase studies and thermodynamic properties, 97
- Scandium hydride
H absorption, 97
- Scandium intermetallic compounds
identification, 27
- SCb-61
erosion, 177
- SCb-291
corrosion, 40
welding, 143
- Silicide coatings
thermal stresses of, on refractory metals, 106
- Silicide fused slurry coatings
development and evaluation, 106
- Silicides
deposition on D-14 and D-43, 140
transformation, 74
- Silicon
corrosion, 177-78
solubility in molten Zn, 236
vapor deposition on Mo and Ta, 199
- Silicon carbide
corrosion, 40
- Silicon coatings (Cr-Si-Ti), 38, 106, 231-32
- Silicon dioxide fibers (Al coated)(irradiated)
strength, 115
- Silicon dioxide fibers (irradiated)
damage, 115
- Silicon fused slurry coatings
development and evaluation, 106
- Silicon monocarbide powder
compaction, 142
- Silicon monocarbide systems
oxidation, 132
- Silicon monocarbide systems (BeO-MgO-SiC)
properties, 223
- Silicon monocarbide systems (BeO-SiC)
properties, 223
- Silicon system films (Al-Si)
annealing and growth, 259
- Silicon system tubes (Al-Fe-Si-U)
(Zircaloy clad)(irradiated)
swelling, 2-4
- Silicon systems
oxidation, 132
- Silicon systems (Al-Fe-Mo-Si-U)
hardness, 2
- Silicon systems (Al-Fe-Ni-Si)
corrosion, 103
- Silicon systems (Al-Si)
corrosion, 103
- Silicon systems (B-Cr-Ni-Si)
(see CM 53)
- Silicon systems (B-Ni-Si)
(see CM 52)
- Silicon systems (Li-Mg-Si)
casting, 256
- Silicon systems (Mo-Nb-Si)
phase studies, 128
- Silicon systems (Mo-Si-U)
phase studies, 74
physical metallurgy, 1
properties, 1-2
- Silicon systems (Mo-Si-U)(irradiated)
swelling, 152
- Silicon systems (Nb-Si)
mechanical properties, 127
- Silver
corrosion, 177-78
diffusion in Be, 248
electrodeposition on Be, 67
solubility in molten Zn, 236
use for brazing, 146
- Silver (irradiated)
primary knock-on recoil spectrum, 192-53
- Silver alloys
use in brazing of Be, 168, 261
- Silver alloys (Be-Ag)
phase studies, 92-93
- Silver alloys (Eu-Ag)
phase studies, 226
- Silver alloys (Cd-In-Ag)(plated)(irradiated)
mechanical properties, 32
- SNAP-8
corrosion in, 176-77
- SNAP-10A/2 reactor
H release from fuel during destructive test, 28
- Sodium
corrosion, 177-78
solubility in molten Zn, 236
- Sodium (molten)
corrosive effects, 39, 109-10, 175-76, 233-34

- effects on EI-437B creep rate, 39-40
 effects on EI-851 creep rate, 39-40
 effects on EI-869 creep rate, 39-40
 effects on ferritic steel relaxation, 39
 O solubility in, 39
 ultrasonic scanning in, 200
 wetting of U ceramics, 110
- Sodium alloys (NaK)**
 corrosive effects, 107-10, 176-77
- Sodium fluoride mixtures (MgF_2 -NaF)**
 (molten)
 corrosive effects, 236
- Sodium-graphite reactors**
 welding in maintenance of, 68
- Sodium systems (O-Na-U)**
 phase studies, 5
- Solids (irradiated)**
 bubble behavior, 213-14
 bubble behavior during annealing, 162
 defect structure, 116
 radiation saturation, 116
- Solutions (fuel reprocessing)**
 corrosive effects, 178
- Spectrometers (Compton)**
 use in nondestructive-assay of fuels, 70
- Stainless steel**
 compatibility with fission-Pu alloys, 5
 compatibility with Pu-Ti-U alloys, 5
 corrosion, 174-75, 230
 corrosion of B-containing, 50
 explosive cladding of mild steel with, 67
 friction welding, 68
 hot-working properties of B-containing, 50
 joining, 68, 146-47
 oxidation, Si effects on, 229
 properties, rare-earth effects on, 244
 sensitization, aging effects on, 184
 tensile properties, 184
- Stainless steel (irradiated)**
 corrosion, 174
 damage, 115
 ductility, 112, 239
 properties, 43-44
- Stainless-steel cermets (stainless steel-UO₂)**
 development, 9, 79
- Stainless-steel cladding**
 reaction with steam, 237-38
- Stainless-steel compacts (PuN-stainless steel)**
 oxidation, 8
- Stainless-steel dispersions (Eu_2O_3 -stainless steel)(irradiated)**
 properties, 228
- Stainless-steel dispersions (Eu_2O_3 -stainless steel)(stainless-steel clad)(irradiated)**
 examination, 171-72
- Stainless-steel dispersions (stainless steel-UO₂)**
 fabrication, 155-56
- Stainless-steel system cladding (B-stainless steel)(irradiated)**
 performance, 226, 228
- Stainless-steel systems (Cr-stainless steel)**
 stress rupture in liquid metal, 233
- Stainless-steel tubing**
 lining with Al, 68
 mechanical properties, 118
 thickness measurement, 263-64
 welding, 68
- Stainless steel (17-4 PH)**
 corrosion, 36-37
- Stainless steel (17-4 PH)(irradiated)**
 embrittlement, 189-90
- Stainless steel (18-8)(irradiated)**
 ductility, Ti effects on, 43
- Stainless steel (20-25)(irradiated)**
 stress-corrosion cracking, 104
- Stainless steel (25-20)**
 corrosion, 103-4
- Stainless-steel (301) tanks**
 burst testing, 184
- Stainless steel (302)**
 corrosion, 36
- Stainless steel (303)**
 corrosion, 36
- Stainless steel (304)**
 carburization, 176
 compatibility with Pu-Th-U alloys, 9
 compatibility with Pu-U-Zr, 5, 205
 compatibility with $Pu_{0.2}C-U_{0.8}C$ system, 8
 corrosion, 36-37, 103-4, 109-10, 178-79, 236
 creep properties, 56, 113
 development of boronated, 99
 ductility, 43
 nitriding, 175
 nondestructive testing of brazed joints in, 70
 penetration by molten Pu-U-Zr alloys, 205
 reaction with PuC-UC system, 159
 reaction with steam, 41, 174-75, 179-80, 237
 rupture life, carburization effects on, 124
 stress-corrosion cracking, 104, 230
 stainless-steel (304) corrosion-product deposition on, 36
 ultrasonic testing, 69
- Stainless steel (304)(irradiated)**
 behavior of boronated, 99
 creep properties, 44, 113
 ductility, 43, 189
 embrittlement, 43, 189-90, 239
 He production, 192
 H production, 192
 mechanical properties, 190
 microstructure, 190
- Stainless-steel (304) cladding (irradiated)**
 properties, 189
- Stainless-steel (304) tubing**
 collapse and creep-buckling, 118
 corrosion of brazed joints, 234
- Stainless-steel (304B) dispersions**
 stainless steel(304B)-UO₂
 fabrication and mechanical properties, 209
- Stainless steel (304L)**
 ductility, 43
- Stainless steel (304L)(irradiated)**
 ductility, 43
- Stainless-steel (304L) cladding(irradiated)**
 burst testing, 239
- Stainless-steel (304L) dispersions (PuO₂-stainless steel(304L))**
 development, 9
- Stainless-steel (304L) dispersions (PuO₂-stainless steel(304L)(irradiated))**
 properties, 9
- Stainless steel (304L sensitized)**
 corrosion, 36
- Stainless steel (310)**
 mechanical properties, sigma-phase effects on, 59
 microstructural evaluation for cladding use, 51
 properties, Ce effects on, 244
 sigma-phase identification, 50
 stress-corrosion cracking, 104
 wetting by Bi-Pb eutectic, 178
- Stainless steel (316)**
 brazing, 94, 146
 carburization, 176
- Stainless steel (316)(irradiated)**
 cavitation, 105
 compatibility with Be, 94
 corrosion, 36-37, 40-41, 233
 nitriding, 175
 properties, Ce effects on, 244
 reaction with Fe-UC system, 159
 reaction with UC, 159
- Stainless steel (316)(irradiated)**
 ductility, B effects on, 112
 embrittlement, 189-90
 He production, 192
 H production, 192
- Stainless-steel (316) couples**
 stress-corrosion cracking, 104
 tensile properties, 112-13
- Stainless-steel (316) couples**
 corrosion, 109
- Stainless-steel (316) tubing**
 bonding to Nb, 198
- Stainless steel (316L)**
 oxidation, Mo effects on, 229-30
 welding, 145
- Stainless steel (316L)(irradiated)**
 embrittlement, 189-90
- Stainless steel (321)**
 corrosion, 41
- Stainless-steel (321) couples**
 corrosion, 109
- Stainless steel (347)**
 corrosion, 41
- Stainless steel (347)(irradiated)**
 properties, 192, 239
- Stainless-steel (347) dispersions (stainless steel(347)-UO₂-ZrB₂)**
 properties, 156
- Stainless-steel (347) dispersions (stainless steel(347)-UO₂-ZrB₂(Nb coated))**
 properties, 156
- Stainless-steel (347) dispersions (stainless steel (347)-UO₂)**
 preparation, 208-9
- Stainless-steel (347) dispersions (stainless steel (347)-UO₂(irradiated))**
 swelling, 208-9
- Stainless-steel (347) tubes (irradiated)**
 ductility, 190
- Stainless-steel (348) cladding (irradiated)**
 evaluation, 190
- Stainless steel (405)**
 corrosion, 178-79
- Stainless steel (406)**
 corrosion, 37
- Stainless steel (406)(irradiated)**
 tensile properties, 112-13
- Stainless-steel (406) tubing**
 strength, 117
- Stainless steel (410)**
 corrosion, 103-4
 joining to Zircaloy, 68
 stainless-steel (304) corrosion-product deposition on, 36
 wetting by Bi-Pb eutectic, 178
- Stainless steel (410)(irradiated)**
 properties, 192
- Stainless steel (430)**
 corrosion, Mo and U effects on, 230
 wetting by Bi-Pb eutectic, 178
- Stainless steel (502)**
 wetting by Bi-Pb eutectic, 178
- Stainless steel (A-286)(irradiated)**
 properties, 192
- Stainless steel (austenitic)**
 corrosion, 174
 oxidation, Mo effects on, 229-30
 properties, 50, 244
- Stainless steel (austenitic)(irradiated)**
 corrosion, 174

- ductility, 112, 189
mechanical properties, 239-40
properties, 244
- Stainless-steel (austenitic) tubing
strength, 117
- Stainless steel (Cr-Ni)
oxidation, Si effects on, 229
- Stainless steel (Cr-Ni)(irradiated)
properties, 113
- Stainless-steel (Cr-Ni-Nb-stabilized) tubing
(irradiated)
ductility and strength, 43-44
- Stainless steel (nitrided)
corrosion, 36
- Star J
corrosion, 40
- Steel
corrosion inhibition, 36
explosive forming, 260
fatigue properties, creep effects on, 54
properties, 180-81
- Steel (irradiated)
mechanical properties, H effects on, 241
properties, 180-81
- Steel (19-9DL)
corrosion, 41
- Steel (1020 carbon)
corrosion, 109-10, 178-79
- Steel (1035)
friction welding, 68
- Steel (3140)
friction welding, 68
- Steel (4140)
friction welding, 68
- Steel (A-212B)
hardenable, U addition effects on, 50
- Steel (A-212B)(irradiated)
embrittlement, 190
- Steel (A-302B)
fatigue properties, 181
- Steel (A-302B)(irradiated)
damage, 190
hardening, 241
- Steel (A-350 LF1(Modified)) (irradiated)
embrittlement, 190
- Steel (alloy)
mechanical properties of strain-aged,
181
- Steel (austenitic)
annealing, 244
- Steel (austenitic)(irradiated)
corrosion, 113
fission-fragment damage, 190
- Steel (carbon)
corrosion, 37, 110, 230
friction welding, 68
- Steel (carbon)(irradiated)
corrosion, 174
hardening, 241
mechanical properties, 191
- Steel (Cr)
properties, 244
- Steel (Cr)(irradiated)
properties, 244
- Steel (Cr-Mn) sheet (irradiated)
mechanical properties, 191
- Steel (Cr-Mn-Ni)
friction welding, 68
- Steel (Cr-Mo)
carburization, 176
corrosion, 235
properties, 190-91, 244
wetting by Bi-Pb eutectic, 178
- Steel (Cr-Mo)(irradiated)
properties, 190-91, 244
- Steel (Cr-Mo-Ni)(irradiated)
hardening, 241
- tensile properties, 191
- Steel (Cr-Ni)
creep rates, 39-40
- Steel (Cr-Ni-Nb)
annealing, 244
- Steel (Ducol W30)
fatigue properties, 181
- Steel (EI-851)
creep rates, 39-40
- Steel (ferritic)
relaxation, 39
- Steel (high strength)
development, 69
fracture toughness, 117
joining, 68-69
- Steel (low alloy)
corrosion, 230
- Steel (low alloy)(irradiated)
hardening, 241
properties, 190-91
- Steel (Mn)
properties, 244
- Steel (Mn)(irradiated)
properties, 244
- Steel (Mn-Mo)
mechanical properties, 124
- Steel (maraging)
welding, 261
- Steel (maraging)(irradiated)
brittle-ductile transition temperature,
112
tensile properties, 191
- Steel (mild)
corrosion, 37
explosive cladding of, 67
fatigue-limit behavior, 181
ultrasonic testing for fatigue cracks, 200
- Steel (mild)(irradiated)
mechanical properties, 111-12
- Steel (Ni)(irradiated)
properties, 46, 49
- Steel (⁶⁰Ni maraging)
welding, 69
- Steel (Soudetenax 56)
fatigue properties, 181
- Steel (T-1)
friction welding, 68
- Steel (ZA)
fatigue properties, 181
- Steel (ZD)
fatigue properties, 181
- Steel (ZS)
fatigue properties, 181
- Steel pressure vessels
fracture mechanics, 181
- Stellite 6B
erosion, 177
- Strontium
diffusion in graphite, 91
phase diagrams, 186
solubility in molten Zn, 236
- Strontium alloys (Cd-Sr)
phase studies, 226
- Strontium hydride systems (Sr-SrH₂)
phase studies, 224
- Strontium systems (Sr-SrH₂)
phase studies, 224
- Structural materials, 35-62, 103-37, 174-
96, 229-54
- SU-16
properties, 53
- Sylvania "A"
creep properties, 181
welding, 143
- Systems for Nuclear Auxiliary Power
(see SNAP...)
- T
T-111
corrosion, 40, 108, 234
creep properties, 249-50
diffusion bonding, 64
erosion, 177
evaporation loss, 124-25
stress-corrosion cracking, 235-36
welding, 143-44
- T-111 tubing
fabrication, 257
- T-222
coatings for, 232-33
corrosion, 40
creep properties, 181, 249-50
welding, 143
- Tantalum
C in, interstitial ordering of, 53
coatings for, 38
compatibility with Pu_{0.2}C-U_{0.8}C system, 8
compatibility with PuO₂-UO₂ system, 78
compatibility with Th, 9
compatibility with UC-ZrC system, 159
compatibility with UP, 212
corrosion, 37-38, 40, 177-79, 234-36
creep-rupture properties, 249
deposition by sputtering, 66
electrodeposition of, 141
H embrittlement, 247
metallurgy, 53
oxidation, 105
oxide-dispersion hardening, 51
phase diagrams, 186
properties, 175
reaction with PuC-UC system, 159
reaction with steam, 42
reaction with UO₂, 211
recrystallization temperature, Y effects
on, 185
siliconizing of, 199
solubility in molten Pu, 5
solubility in rare earths, 185
surface-recession rates, 125
thermal expansion, 53
use to protect thermocouples, 105
vapor deposition of, 65-66, 199, 259
work hardening, strain-aging effects
on, 126
- Tantalum (Ir plated)
brittleness, 141
- Tantalum (irradiated)
corrosion, 174
- Tantalum alloy coatings (Hf-Mo-Ta)
oxidation, 106
- Tantalum alloy coatings (Hf-Ta)
oxidation, 106
for Ta, 38
for Ta alloys, 233
- Tantalum alloys
cavitation, 105
coatings for, 38, 233
metallurgy, 53
properties, 175
reactions with UC, 84
reactions with UN, 84
thermal properties, 184
welding, 142-43, 262
- Tantalum alloys (Al-Hf-Nb)
oxidation, 100
- Tantalum alloys (Al-Hf-Ta)
oxidation, 100
- Tantalum alloys (Al-Nb-Ta-Ti)
crack growth, 230
welding, 145
- Tantalum alloys (Cr-Hf-Ta)
oxidation, 100

- Tantalum alloys (Hf-Re-Ta)
phase studies, 129
- Tantalum alloys (Hf-Ta)
phase studies, 226
- Tantalum alloys (Hf-Ta-W)
(see also T-111)
cavitation, 105
corrosion, 108
phase studies, 247
- Tantalum alloys (high-strength)
oxidation, 125
- Tantalum alloys (Mo-Nb-Zr)
(see SCB-61)
- Tantalum alloys (Mo-Ta-V)
phase studies, 129
- Tantalum alloys (Nb-Ta)
corrosion, 230-31
mechanical properties, 127
- Tantalum alloys (Nb-Ta-Ti-V)
creep resistance, 53
- Tantalum alloys (Nb-Ta-W)
(see also SCB-291)
corrosion, 233-34
- Tantalum alloys (Nb-Ta-W-Zr)
(see FS-85)
- Tantalum alloys (Nb-Ta-V)
phase studies, 129
- Tantalum alloys (Nb-Ta-Zr)
removal of N and O, 63
- Tantalum alloys (Pt-Ta)
phase studies, 53
- Tantalum alloys (Ta-W)
cavitation, 105
coatings for, behavior of, 231-32
corrosion, 40, 178, 231
creep properties, 249-50
electroplating with WSi_2 and ZrO_2 , 259-60
mechanical properties, B effects on, 246-47
physical properties, B effects on, 246-47
welding, 143
- Tantalum alloys (Ta-W-Zr)
phase studies, 247
- Tantalum alloys (Ta-V)
corrosion, 230
- Tantalum carbide
C diffusion in, 189
corrosion, 110
interstitial ordering of C in, 53
- Tantalum carbide solid solutions (Hf carbide-Ta carbide)
preparation and properties, 101
- Tantalum carbide systems (Ta-Ta₂C)
whisker reinforcement, 185
- Tantalum couples
corrosion, 108-9
- Tantalum disilicide
thermal dilation, 106
- Tantalum disilicide systems (Ta-TaSi₂)
intermediate-phase growth-rate kinetics, 105
- Tantalum monocarbide
thermal expansion, 133
- Tantalum monocarbide systems (Co-TaC-WC)
(see Carboloy 907)
- Tantalum silicide (TaSi₃)
thermal dilation, 106
- Tantalum silicide systems
oxidation, 132
- Tantalum systems (C-Cr-Co-Ta-W-Y)
oxidation and strength, 131
- Tantalum systems (C-Hf-Ta)
phase studies, 32
- Tantalum systems (C-Hf-Ta-W)
(see T-222)
- Tantalum systems (C-Ta-W)
(see K601)
- Tantalum systems (Hf-Ta)
preparation, 101
- Tantalum systems (SiC-Ta)
oxidation, 132
- Tantalum systems (Ta-Ta₂C)
whisker reinforcement, 185
- Tantalum systems (Ta-TaSi₂)
intermediate-phase growth-rate kinetics, 105
- Technetium
phase diagrams, 186
solubility in molten Zn, 236
- Technetium alloys (Tc-W)
hardness and solid-solution formation, 52
- Technetium alloys (Tc-U)
phase studies, 152
- Television (infrared sensitive)
use in nondestructive testing, 70
- Testing (nondestructive), 69-70, 147-48, 200-1, 263-66
- Terbium
W solubility in, 247
- Thermalox 995A (irradiated)
behavior, 94, 96
- Thorium
compatibility studies, 9
diffusion in UO_2 , 82, 248
electrical resistivity, 155
electrodeposition on Pt, 198-99
Pu solubility in, 79
production, 207
properties, 79
solubility in molten Zn, 236
thermal conductivity, 155
thermoelectric power, 155
uses, potential, 79
- Thorium (irradiated)
physical properties, annealing effects on, 9
- Thorium (Zr clad)
fabrication, 257
- Thorium alloys
properties, 79
tensile properties, 9
- Thorium alloys (Au-Th)(Zr clad)
fabrication, 257
- Thorium alloys (In-Th)
tensile properties, 9
- Thorium alloys (Pu-Th-U)
compatibility studies, 9
development, 6
- Thorium alloys (Th-U)(Zircaloy clad)
coextrusion, 198
- Thorium alloys (Th-U)(Zr clad)
fabrication, 257
- Thorium alloys (Th-Zr)
tensile properties, 9
- Thorium carbide systems (Pu carbide-Th carbide)(coated)(irradiated)
performance, 210
- Thorium compounds
properties, 79
- Thorium couples
corrosion, 108-9
- Thorium dicarbide
crystal structure, 12
PuC solubility in, 12
production by sol-gel process, 8-9
- Thorium dicarbide particles
fabrication of spherical, 13
- Thorium dicarbide system particles (ThC₂-UC₂)
fabrication of spherical, 13
- Thorium dicarbide system particles (ThC₂-UC₂)(coated)(irradiated)
evaluation, 156-57
- Thorium dicarbide systems (graphite-ThC₂)
eutectic, 12
- Thorium dicarbide systems (ThC₂-UC₂)
production by sol-gel process, 8-9
thermal expansion, 86
- Thorium dioxide
surface energy, 13
thermal expansion, 77
- Thorium dioxide coatings
application, 257
for W, 38
- Thorium dioxide dispersions (Mo-Ni-ThO₂)
preparation, 51
- Thorium dioxide dispersions (Ni-ThO₂)
mechanical properties, 51
oxidation, 37
preparation, 51
- Thorium dioxide mixtures (PuO₂-ThO₂) (irradiated)
fission-gas release, 78
- Thorium dioxide particles
coating with porous C, 80
coating with PyC, 156
- Thorium dioxide pellets
fabrication, 157
- Thorium dioxide system particles (ThO₂-UO₂)(PyC coated)(irradiated)
evaluation, 157
- Thorium dioxide system rods (ThO₂-UO₂) (clad)(irradiated)
performance, 13
- Thorium dioxide systems sheet (Re-ThO₂-W)
fabricability and properties, 247
- Thorium dioxide systems (BeO-PuO₂-ThO₂)
phase studies, 8
- Thorium dioxide systems (BeO-ThO₂-UO₂-Y₂O₃)
UO₂ loss, 26-27
- Thorium dioxide systems (BeO-ThO₂-UO₂-Y₂O₃)(irradiated)
fission-gas release, 27
- Thorium dioxide systems (Th-ThO₂)
tensile properties, 9
- Thorium dioxide systems (Th-ThO₂-Zr)
tensile properties, 9
- Thorium dioxide systems (ThO₂-Y₂O₃) (irradiated)
¹³⁵Xe release, 162
- Thorium monophosphide
preparation, 14
- Thorium systems
tensile properties, 9
- Thorium systems (B-Th)(Zr clad)
fabrication, 257
- Thorium systems (C-Pu-Th)
phase studies, 12
- Thorium systems (C-Th)
phase studies, 12
- Thorium systems (Th-ThO₂)
tensile properties, 9
- Thorium systems (Th-ThO₂-Zr)
tensile properties, 9
- Thulium
W solubility in, 247
- Tin
corrosion, 177-78
electrodeposition, 67
solubility in molten Zn, 236
- Tin (molten)
corrosive effects, 178, 236
- Tin alloys (Bi-Sn)(molten)
corrosive effects, 236
- Tin alloys (Cr-Fe-Sn-Zr)
corrosion and mechanical properties, 103
- Tin alloys (Nb-Sn)
phase studies, 52
- Tin alloys (Nb-Sn-Zr)
corrosion, 36
tempering, 50

- Tin alloys (Nb-Sn-Zr)(irradiated)
corrosion, 229, 240
mechanical properties, 240
oxidation, 229
- Tin alloys (Sn-Zr)
corrosion, 36
- Tin coatings (Al-Sn)
behavior, 231-32
for Nb and Nb alloys, 199
- Titanium
bonding, 68, 147
B vapor deposition on, 66
compatibility with UP, 212
corrosion, 39, 104-5, 177-78, 235
deposition on D-14 and D-43, 140
effects on Mo recrystallization temperature, 182
mechanical properties, 182
phase diagrams, 186
properties, hot plastic deformation effects on, 255
solubility in molten Li, 107
solubility in molten Zn, 236
U diffusion in, 248
use in brazing of Be, 168
- Titanium alloy couples (Mo-Ti)
corrosion, 108
- Titanium alloy couples (Mo-Ti-Zr)
corrosion, 108
- Titanium alloy tubing (Ti-V)
fabrication, 198, 256
- Titanium alloys
(see also A-110 AT (irradiated))
corrosion, 105
friction welding, 68
stress-corrosion cracking, 230
- Titanium alloys (Al-Cr-Ti-V)
friction welding, 68
- Titanium alloys (Al-Mo-Ti-V)
properties, 183
- Titanium alloys (Al-Nb-Ta-Ti)
crack growth, 230
welding, 145
- Titanium alloys (Al-Ti-V)
crack growth, 230
welding, 68, 145
- Titanium alloys (Be-Ti-Zr)
use for brazing, 146
- Titanium alloys (Cr-Fe-Ni-Ti)(irradiated)
ductility, B effects on, 112
- Titanium alloys (Cr-Ti-V)
corrosion, 257
creep properties, 186
fabrication, 257
- Titanium alloys (high strength)
fracture toughness, 117
- Titanium alloys (Mo-Nb-Ti-Zr)
(see PWC-533)
- Titanium alloys (Mo-Ti)
binary interdiffusion in, 132
chemical plating of MoSi₂ on, 140
ductility, 125
erosion, 177
- Titanium alloys (Mo-Ti-V)
corrosion, 109
- Titanium alloys (Mo-Ti-Zr)
(see also TZM)
chemical plating of MoSi₂ on, 140
tensile properties, 118
- Titanium alloys (Ni-Ti)
corrosion, 230-31
corrosion of brazed joints using, 40
- Titanium alloys (Nb-Ta-Ti-V)
creep resistance, 53
- Titanium alloys (Nb-Ti)
binary interdiffusion in, 132
coating with PWK-5, 199
high-temperature properties, 185
- Titanium alloys (Nb-Ti-V)
annealing, 53
evaluation, 138
evaporation, 128
preparation, 138
- Titanium alloys (Nb-Ti-Zr)
annealing, 53
- Titanium alloys (Pd-Ti)
corrosion, 105
- Titanium alloys (Pt-Ti)
binary interdiffusion in, 132
- Titanium alloys (Pu-Ti-U)
casting, 138
compatibility with stainless steel, 5
creep properties, 6
ductility, 6
mechanical properties, 75
phase studies, 153
solidus temperatures, 5
thermal conductivity, 153
thermal expansion, 5-6
- Titanium alloys (Pu-Ti-U)(molten)
penetration of Ti-V alloys, 205
penetration by molten Pu-Ti-U alloy, 205
- Titanium alloys (Ti-U)
ductility and thermal expansion, 6
- Titanium alloys (Ti-V)
compatibility studies, 8-9
corrosion, 39, 109, 230, 233
creep, Na effects on, 176
tensile properties, 118
thermal conductivity, 186
thermal expansion, 186
- Titanium alloys (Ti-V)(irradiated)
He and H production, 192
- Titanium alloys (Ti-Zr)
electrodeposition of, 140-41
H terminal solubility in, 28
- Titanium diboride
corrosion, 40
- Titanium carbide
corrosion, 107
- Titanium carbide (Mo bonded)
corrosion, 107-8
- Titanium carbide (Ni bonded)
corrosion, 107-8
- Titanium carbide solid solutions (Hf carbide-Ti carbide)
preparation and properties, 101
- Titanium coatings (Cr-Si-Ti), 38, 106, 231-32
- Titanium dioxide
reaction with UO₂, 82
- Titanium disilicide
oxidation and thermal dilation, 106
- Titanium fused slurry coatings
development and evaluation, 106
- Titanium hydride
mechanical properties, 97
- Titanium monocarbide
corrosion, 40
- Titanium monocarbide systems
corrosion, 40
- Titanium silicide (Ti₃Si₂)
thermal dilation, 106
- Titanium system couples (Mo-Nb-Ti-WC)
corrosion, 108
- Titanium systems (Al-C-Ti-Zr)
mechanical properties at high temperatures, 123
- Titanium systems (C-Mo-Nb-Ti-Zr)
fabrication and properties, 51
- Titanium systems (C-Mo-Ti-Zr)
(see also TZC)
creep-rupture properties, 118
fabrication, 51, 138
properties, 51
- Titanium systems (SiC-Ti)
oxidation, 132
- Titanium systems (Ti-ZrO₂)
thermal shock, 251
- Tracers
diffusion in metals and alloys, 131-32
- Transducers
use in ultrasonic testing, 147-48
- Trichloroethane (1,1,1-)
reaction with burning Pu, 6
- Tubing
bowing measurement, 148
reductions, 138
ultrasonic testing, 147, 200
- Tungsten
C solubility in, 51
casting, 255
coatings for, 38, 105, 233, 257
compatibility with molten UO₂, 211
compatibility with PuO₂-UO₂ system, 78
compatibility with UC-ZrC system, 159
compatibility with UP, 212
corrosion, 40, 177-78, 230
creep properties, 181
creep-rupture properties, 120, 249
diffusion in Mo, 248
electrodeposition of, 141
electroplating on, 67, 141, 198
grain properties, 246-47, 258
hardness, tensile strength relation to, 128
mechanical properties, 52, 182, 246-47, 250
metallurgy, 51-52
oxide-dispersion hardening, 51
phase diagrams, 186
physical properties, B effects on, 246
properties, 175
reaction with PuC-UC system, 159
reaction with steam, 42, 231
reaction with UC, 84
recrystallization, 246-47
solubility in molten UC, 211
solubility in rare earths, 247
strength metal-addition effects on, 182
strengthening, solid solution, 247
surface-recession rates, 125
tensile properties, interstitial effects on, 156
thermal conductivity, 126, 208
use for coating nonmetallic powders, 139-40
vapor deposition, 65, 139, 259
vapor pressure, 186
welding, 143-45
zone refining, 126
- Tungsten (arc melted)
properties, 126
- Tungsten (irradiated)
creep-rupture properties, 241-42
- Tungsten alloy rod (Mo-Re-W)
fabrication, 256
- Tungsten alloy sheet (Re-W)
Young's modulus, static, 118, 120
- Tungsten alloy thermocouples (Re-W vs. W)
sheathing of, 105
- Tungsten alloy tubing (Re-W)
fabrication, 63, 256
- Tungsten alloys
metallurgy, 51-52
oxidation, 231
properties, 175
welding, 262
- Tungsten alloys (Cr-Co-Fe-Ni-W)
(see L-605)
- Tungsten alloys (Cr-Co-Ni-W)
(see Haynes 25)

- Tungsten alloys (Co-W)
vapor deposition, 258
- Tungsten alloys (Cu-Ni-W)
properties, 126
- Tungsten alloys (Hf-Nb-W)
(see also C-129)
cavitation, 105
- Tungsten alloys (Hf-Nb-W-Y)
(see C-129Y)
- Tungsten alloys (Hf-Ta-W)
(see also T-111)
cavitation, 105
corrosion, 108
phase studies, 247
- Tungsten alloys (Hf-W)
mechanical properties, 247
- Tungsten alloys (high strength)
oxidation, 125
- Tungsten alloys (Ir-W)
casting, 255
- Tungsten alloys (Mo-Nb-W-Zr)
(see F-48)
- Tungsten alloys (Mo-Os-W)
phase studies, 128-29
- Tungsten alloys (Mo-Re-W)
creep-rupture properties, 120
creep strength, 249
powder metallurgy, 256
- Tungsten alloys (Mo-W)
corrosion, 178
mechanical properties, 249
reaction with UC, 84
- Tungsten alloys (Mo-W-Zr)
phase studies, 129
- Tungsten alloys (Ni-W)
creep rates, 54
- Tungsten alloys (Nb-Ta-W)
(see also SCb-291)
corrosion, 233-34
- Tungsten alloys (Nb-Ta-W-Zr)
(see FS-85)
- Tungsten alloys (Nb-W)
mechanical properties, 52, 127, 247
reaction with UC, 84
reaction with UN, 84
- Tungsten alloys (Nb-W-Y-Zr)
(see AS-55 and D-43Y)
- Tungsten alloys (Nb-W-Zr)
(see Cb-752, D-43, and X-34)
- Tungsten alloys (Os-W)
casting, 255
- Tungsten alloys (Re-W)
age hardening, 186
casting, 255
chemical plating using, 199
corrosion, 108
creep properties, 181, 249
creep-rupture properties, 120, 249
deposition of, 65, 140
fabrication, 256
powder metallurgy, 256
recrystallization temperature, ThO₂
effects on, 247
vapor deposition, 258
welding, 143
- Tungsten alloys (Ta-W)
casting, 255
cavitation, 105
coatings for, 231-32, 259-60
corrosion, 40, 178, 231
creep properties, 249-50
mechanical properties, 246-47
physical properties, 246-47
welding, 143
- Tungsten alloys (Ta-W-Zr)
phase studies, 247
- Tungsten alloys (Tc-W)
hardness and solid-solution formation, 52
- Tungsten carbide
corrosion, 107
- Tungsten carbide (Co bonded)
corrosion, 107-8
- Tungsten carbide (Mo bonded)
corrosion, 107-8
- Tungsten carbide (Ni bonded)
corrosion, 107-8
- Tungsten disilicide
chemical deposition, 66
oxidation, 106
thermal dilation, 106
- Tungsten disilicide coatings
electroplating on Ta-W alloy, 259-60
- Tungsten dispersions (W-UC)
density, 208
preparation, 207-8
thermal conductivity, 207-8
- Tungsten fused slurry coatings
development and evaluation, 106
- Tungsten monocarbide
solubility in molten Zr, 128
- Tungsten monocarbide system couples
(Mo-Nb-Ti-WC)
corrosion, 108
- Tungsten monocarbide system (Co-TaC-WC)
(see Carboly 907)
- Tungsten monocarbide systems (Co-WC)
(see Carboly 999)
- Tungsten oxide systems (Nb₂O₅-WO₃)
phase studies, 133
- Tungsten powder
use as binder for ZrB₂, 172
- Tungsten rod
Young's modulus, static, 118, 120
- Tungsten sheet
fabrication, 256-57
Young's modulus, static, 118, 120
- Tungsten silicide (W₅Si₃)
thermal dilation, 106
- Tungsten silicide systems
oxidation, 132
- Tungsten single crystals
deformation and fracture, 120
- Tungsten strip
fabrication, 256-57
- Tungsten system sheet (Re-ThO₂-W)
fabricability and properties, 247
- Tungsten systems (C-Cr-Co-Fe-Ni-W)
(see Star J)
- Tungsten systems (C-Cr-Co-Mo-W-Y)
oxidation and strength, 131
- Tungsten systems (C-Cr-Co-Nb-W-Y)
oxidation and strength, 131
- Tungsten systems (C-Cr-Co-Ta-W-Y)
oxidation and strength, 131
- Tungsten systems (C-Hf-Ta-W)
(see T-222)
- Tungsten systems (C-Nb-W-Zr)
cold working, 127
corrosion, 233-34
- Tungsten systems (C-Ta-W)
(see K601)
- Tungsten systems (Co-O-W)
phase studies, 129
- Tungsten systems (C-W-Zr)
phase studies, 50, 128
- Tungsten systems (Hf-Mo-Nb-W)
(see SU-16)
- Tungsten systems (SiC-W)
oxidation, 132
- Tungsten systems (W-UC)
solidus temperature, 84
- Tungsten thermocouples (Re-W vs. W)
sheathing of, 105
- Tungsten trioxide
melting point, 173
- Tungsten trioxide systems (B₂O₃-WO₃)
phase studies, 173
- Tungsten tubing
fabrication, 63
- Tungsten wire
cavities in sintered, 186
- TZC
creep properties, 181
creep-rupture properties, 118
erosion, 177
fatigue properties, 181
stress-rupture properties, 250-51
- TZM
coatings for, 231-33, 257
corrosion, 40-41, 234
creep properties, 181
creep-rupture properties, 249
diffusion bonding, 64
ductile-brittle transition temperature, 125
ductility, 125
erosion, 177
fatigue properties, 181
mechanical properties, 56
PFR-6 coating development for, 106
properties, 124
reactions with UC and UN, 84
recrystallization temperature, 125
strength, C effects on, 125
tensile properties, 118
- TZM (irradiated)
mechanical properties, 124
- TZM couples
corrosion, 108
diffusion behavior in Pt-coated, 233
- U
Udimet 700
stress-rupture properties, 250-51
- Ultrasonic testing, 69-70, 147-48, 200, 263
- Unidye bonding, 68, 147
- Uranium
annealing, 203
carbide removal using HNO₃, 74
casting, 255
Cr diffusion in, 248-49
coatings for, 66-67
Co diffusion in, 248-49
compatibility studies, 37
Cu diffusion in, 248-49
corrosion, 74
diffusion bonding to Mg using Cu and Ni, 67
diffusion in materials, 82, 188, 248
ductile-brittle transition temperature, 203
ductility, 203, 255
electrodeposition of metals on, 141-42, 259
electrodeposition on Pt, 198
fatigue properties, 73
fracture, 151
ion plating on, 151, 200
Fe diffusion in, 248-49
Fe solubility in, 203
Mn diffusion in, 248-49
melting point, C effects on, 74
metallography, 203
metallurgy, physical, 151
Ni diffusion in, 248-49
Nb diffusion in, 248-49
nitride removal using HNO₃, 74
oxidation, 73, 212-13
phase changes, kinetics of, 152
preferred orientation, 1

- production by skull-reduction process, 138
- purification by zone melting, 203
- rolling, carbide-inclusion effects on, 255
- self-diffusion in UO_2 , 158-59
- self-diffusion in UC, 211-12
- solubility in molten Zn, 236
- structure, network, 151
- tensile deformation, 203
- texture, 74
- thermal expansion, 203
- x-ray diffraction studies, 74
- Uranium (adjusted)
- intermetallic compounds in, distribution and identification of, 73
- Uranium (irradiated)
- annealing effects on swelling, 1
- damage, 213
- fission-gas bubbles in, 15-16, 87, 162
- fission-gas release, 163
- growth, prediction of, 162
- Kr diffusion in, 87
- mass transport by fission fragments, 16
- reaction with water, 15, 161
- swelling, 1, 15, 87
- thermal conductivity, 151
- Xe diffusion in, 87, 213
- Uranium (molten)
- corrosive effects, 110
- UC solubility in, 84
- Uranium (Ni plated)
- porosity, 142
- Uranium (Zircaloy clad)
- coextrusion, 198
- Uranium alloy coatings (Al-U)
- oxidation, 66
- Uranium alloy films (Mo-U)(irradiated)
- fission-fragment tracts, 17
- Uranium alloy tubes (Al-Fe-U)(Zircaloy clad)(irradiated)
- swelling, 2-4
- Uranium alloy tubes (Mo-U)(Zircaloy clad) (irradiated)
- swelling, 3-4
- Uranium alloys, 1-5
- corrosion, 74
- particle studies in, 73-74
- rolling, 63
- x-ray diffraction studies, 74
- Uranium alloys (Al-Fe-U)
- precipitate solution in, 73
- UAl precipitates in, 151-52
- Uranium alloys (Al-Mo-U)(Al clad) (irradiated)
- properties, 203-4
- Uranium alloys (Al-U)
- transformation, 1, 74
- Uranium alloys (Cr-Nb-U)
- transformation, 1
- Uranium alloys (Cr-U)
- phase changes, kinetics of, 152
- transformation, 1
- Uranium alloys (Cr-U-V)
- phase studies, 204
- Uranium alloys (fissium-Pu-U)
- compatibility with stainless steel, 5
- development, 6
- phase studies, 74-75
- solidus temperatures, 5
- Uranium alloys (fissium-Pu-U)(clad) (irradiated)
- burnup, 74
- Uranium alloys (fissium-Pu-U)(irradiated)
- properties, 205-6
- Uranium alloys (fizzium-Pu-U)(irradiated)
- properties, 205-6
- Uranium alloys (Fe-Pu-U)
- properties, 153-54
- Uranium alloys (Fe-U)
- transformation, 1
- Uranium alloys (irradiated)
- microstructure effect on cavitation
- swelling of dilute, 2
- reactions with water, 15
- Uranium alloys (Mo-Pu-U)
- fabrication, 138
- thermal expansion, 206
- Uranium alloys (Mo-U)
- specific heat, 204
- transformation, 1
- Uranium alloys (Mo-U)(irradiated)
- swelling, 152
- Uranium alloys (Mo-U)(stainless-steel(304) clad)(irradiated)
- behavior, 4-5
- Uranium alloys (Nb-U)
- specific heat, 205
- transformation, 1
- Uranium alloys (Nb-U-Zr)
- properties, 204
- Uranium alloys (Nb-U-Zr)(irradiated)
- reaction with water, 161
- Uranium alloys (Pu-Th-U)
- compatibility studies, 9
- development, 6
- Uranium alloys (Pu-Ti-U)
- casting, 138
- compatibility with stainless steel, 5
- creep properties, 6
- ductility, 6
- mechanical properties, 75
- phase studies, 153
- solidus temperatures, 5
- thermal conductivity, 153
- thermal expansion, 5-6
- Uranium alloys (Pu-Ti-U)(molten)
- penetration of Ti-V alloy, 205
- Uranium alloys (Pu-U)
- development, 5-6
- phase studies, 75
- Uranium alloys (Pu-U-Zr)
- casting, 138
- compatibility with stainless steel (304), 5, 205
- creep properties, 6
- mechanical properties, 75
- phase studies, 75, 153
- solidus temperatures, 5
- thermal conductivity, 153, 205
- thermal expansion, 6
- transformation, 75
- Uranium alloys (Pu-U-Zr)(molten)
- penetration of stainless steel (304), 205
- Uranium alloys (Tc-U)
- phase studies, 152
- Uranium alloys (Th-U)(Zircaloy clad)
- coextrusion, 198
- Uranium alloys (Th-U)(Zr clad)
- fabrication, 257
- Uranium alloys (Ti-U)
- ductility and thermal expansion, 6
- Uranium alloys (U-UCo₂-UMn₂)
- phase studies, 152-53
- Uranium alloys (U-Zr)
- metallography of hydrided, 170
- Uranium alloys (U-Zr)(irradiated)
- decomposition, 2
- swelling, 153
- Uranium alloys (U-Zr)(Zircaloy clad)
- coextrusion, 198
- Uranium alloys (Zircaloy clad)
- coextrusion, 198
- Uranium carbide
- casting, 197
- fabrication, 212
- melting, 197
- synthesis, 212
- yield strength, 159-60
- Uranium carbide (irradiated)
- fission-gas release, 163
- Uranium carbide cermets
- fracture, 79
- Uranium carbide particles (PyC coated)
- development, 156
- Uranium carbide single crystals (irradiated)
- point-defect clusters, 213
- Uranium carbide systems (Pu carbide-U carbide)
- compatibility studies, 8
- fabrication, 212
- synthesis, 212
- thermal diffusivity, 7
- Uranium carbide systems (Pu carbide-U carbide)(Nb clad)(irradiated)
- properties, 160
- Uranium carbide systems (Pu carbide-U carbide)(stainless-steel clad)(irradiated)
- properties, 160
- Uranium carbide systems (U carbide-Zr carbide)
- fabrication and synthesis, 212
- Uranium carbonitride
- preparation and sintering, 13-14
- Uranium ceramics
- wetting by liquid Na, 110
- Uranium dicarbide
- C activity and solubility in, 84
- coating with Nb, 200
- extrusion, 255
- thermodynamic properties, 13
- US solubility in, 84
- Uranium dicarbide particles
- fabrication of spherical, 13
- Uranium dicarbide particles (PyC coated)
- evaluation, 210
- Uranium dicarbide particles (PyC coated) (irradiated)
- analysis, x-ray microprobe, 10
- evaluation, 10, 157
- Uranium dicarbide single crystals (irradiated)
- point-defect clusters, 87-88
- Uranium dicarbide solid solutions (UC₂-YC₂)
- phase studies, 159
- Uranium dicarbide system particles (ThC₂-UC₂)
- fabrication of spherical, 13
- Uranium dicarbide system particles (ThC₂-UC₂)(coated)(irradiated)
- evaluation, 156-57
- Uranium dicarbide systems (ThC₂-UC₂)
- production by sol-gel process, 8-9
- thermal expansion, 86
- Uranium dicarbide systems (UC₂-UC)
- phase studies, 84
- Uranium dioxide
- enthalpy, 11
- heat of sublimation, latent, 211
- loss from Mo-UO₂ dispersions, heat effects on, 79
- mechanical properties, H effects on, 82
- melting point, 157
- metal diffusion in, 248
- point defects in, 11
- reaction with Al, 82
- reaction with Ta, 211
- reaction with TiO₂, 82
- reaction with water, 82-83
- reaction with Zircaloy-2, 81-82
- thermal conductivity, 208
- thermal expansion, 77, 211
- U self-diffusion in, 158-59
- vapor deposition, 140, 259
- vapor pressure, 157

- wetting by liquid Na, 110
- Uranium dioxide (irradiated)
- fission-gas bubble distribution in, 16-17, 87
 - fission-product distribution in, 11
 - fission-product release, 163, 210-11, 214
 - Pu distribution in, 11
 - self-diffusion in, 11
 - void migration, 17
 - Xe diffusion in, 10-11, 16
 - Xe release from doped, 16
- Uranium dioxide (molten)
- compatibility with W and vapor pressure, 211
- Uranium dioxide (stainless-steel clad)
- reaction with steam, 237-38
- Uranium dioxide (stainless-steel clad) (irradiated)
- fission-gas pressure in, 158
- Uranium dioxide (stainless-steel(304) clad)
- ultrasonic testing, 69
- Uranium dioxide (stainless-steel(304) clad) (irradiated)
- reaction with water vapor in, 157-58
- Uranium dioxide (stainless-steel(304) clad) (molten)
- reaction with water, 110-11
 - reaction with steam, 238-39
- Uranium dioxide (Zircaloy-2 clad)(molten)
- reaction with water, 110-11
- Uranium dioxide (Zr clad)
- reaction with steam, 238
- Uranium dioxide cermets
- development, 9, 79
- Uranium dioxide compacts
- actinide-element diffusion in, 82
 - preparation, 11, 211
- Uranium dioxide dispersions
- cladding materials for, 79
 - thermal stability, 209
- Uranium dioxide dispersions (Fe-UO₂) (Al-Cr-Fe-Y alloy clad)
- preparation, 79-80
- Uranium dioxide dispersions (Mo-UO₂)
- UO₂ loss, heat effects on, 79
- Uranium dioxide dispersions (Nb-(Pu-UO₂) particles (coated)-Zr)
- preparation, 80
- Uranium dioxide dispersions (stainless steel-UO₂)
- fabrication, 155-56
- Uranium dioxide dispersions (stainless steel (304B)-UO₂)
- fabrication and mechanical properties, 209
- Uranium dioxide dispersions (stainless steel (347)-UO₂)
- preparation, 208-9
- Uranium dioxide dispersions (stainless steel (347)-UO₂)(irradiated)
- swelling, 208-9
- Uranium dioxide dispersions (stainless steel(347)-UO₂-ZrB₂)
- properties, 156
- Uranium dioxide dispersions (stainless steel(347)-UO₂-ZrB₂)(Nb coated)
- properties, 156
- Uranium dioxide dispersions (W-UO₂)
- density, 208
 - preparation, 207-8
 - thermal conductivity, 207-8
- Uranium dioxide films (irradiated)
- fission-fragment tracks, 17
 - grain growth in, 163
 - mass transport in, 163
- Uranium dioxide mixtures (BeO-UO₂)
- creep properties, 58
- Uranium dioxide mixtures (PuO₂-UO₂-ZrO₂)
- preparation, 82
- Uranium dioxide mixtures (UO₂-ZrB₂) (irradiated)
- performance, 226, 228
- Uranium dioxide mixtures (UO₂-ZrO₂) (Zircaloy clad)(irradiated)
- homogenization of two-phase, 214
- Uranium dioxide particles
- production of spherical, 11-12
- Uranium dioxide particles (Al₂O₃ coated) (irradiated)
- evaluation, 10
- Uranium dioxide particles (PyC coated) (irradiated)
- evaluation, 10, 156-57, 210
- Uranium dioxide pellets
- fabrication, 157
 - preparation, 82
 - properties, 82
- Uranium dioxide powder
- compaction, 142
- Uranium dioxide single crystals
- creep, 211
- Uranium dioxide single crystals (irradiated)
- fission-gas release, 214
 - Xe diffusion from, 210-11
- Uranium dioxide system particles (ThO₂-UO₂)(PyC coated)(irradiated)
- evaluation, 157
- Uranium dioxide system pellets (PuO₂-UO₂)
- preparation of glass-bonded, 8
- Uranium dioxide system pins (PuO₂-UO₂) (irradiated)
- behavior, 8
- Uranium dioxide system rods (ThO₂-UO₂) (clad)(irradiated)
- performance, 13
- Uranium dioxide systems (BeO-ThO₂-UO₂-Y₂O₃)
- UO₂ loss, 26-27
- Uranium dioxide systems (BeO-ThO₂-UO₂-Y₂O₃)(irradiated)
- fission-gas release, 27
- Uranium dioxide systems (CaO-PuO₂-UO₂-ZrO₂)
- melting points, 78
- Uranium dioxide systems (graphite-UO₂)
- melting, 197
- Uranium dioxide systems (PuO₂-UO₂)
- compatibility with refractory metals, 78
 - density, 154
 - melting point, 154
 - particle-size-distribution determination, 8
 - preparation of spherical particles, 154
 - thermal expansion, 77
 - thermal gradient effects, 78
- Uranium dioxide systems (PuO₂-UO₂)(self irradiated)
- lattice parameters, 207
- Uranium dioxide systems (PuO₂-UO₂-ZrO₂)
- lattice parameters and stability, 154
- Uranium dioxide systems (UO₂-Y₂O₃) (irradiated)
- ¹³⁵Xe release, 162
- Uranium dioxide systems (UO₂-ZrO₂) (irradiated)
- homogenization, 163
- Uranium fluoride systems (BeF₂-LiF-UF₄-ZrF₄)(molten)
- corrosive effects, 110
- Uranium fuel materials (irradiated)
- properties, 153
- Uranium hydride systems (U hydride-Zr hydride)
- pulse-heating effects, 28
 - thermal behavior, 224
- Uranium intermetallic compound coatings (UAl₃)
- oxidation, 66
- Uranium intermetallic compound dispersion films (Al-UAl₃)(irradiated)
- fission-fragment tracks, 17
- Uranium intermetallic compound dispersions (Al-U aluminide)
- fabrication, 208
- Uranium intermetallic compound dispersions (Al-U aluminide)(irradiated)
- properties, 208
- Uranium intermetallic compounds (UAl₃)
- precipitation in Al-Fe-U alloys, 151-52
 - preparation, 208
- Uranium intermetallic compounds (UAl₃)
- preparation, 208
- Uranium intermetallic compounds (U₂Co)
- solid solubility, 153
- Uranium intermetallic compounds (U₂Mn)
- solid solubility, 153
- Uranium monoarsenide powder
- ignition, 160
- Uranium monocarbide
- C activity in, 84
 - C self-diffusion in, 211-12
 - casting, 255
 - coating, 197
 - corrosion, Fe effects on, 161-62
 - creep rate, 84, 212
 - dynamic modulus, U effects on, 13
 - extrusion, 255
 - free energy of formation, 84
 - hot hardness, C effects on, 159
 - hydrolysis, 15
 - melting, 197-98
 - preparation, 14
 - preparation, 83
 - properties, 84
 - reaction with Mo-W alloy, 84
 - reactions with Nb alloys, 84
 - reaction with stainless steel (316), 159
 - reactions with Ta alloys, 84
 - reaction with W, 84
 - reaction with TZM, 84
 - reduction in H₂, 161
 - sintering, 161
 - slip, 212
 - solubility in liquid U, 84
 - strength, W effects on, 159
 - thermal conductivity, 84, 211-12
 - U diffusion, 211-12, 248
 - wetting by liquid Na, 110
- Uranium monocarbide (irradiated)
- CO release, 212
 - lattice parameters, 213
 - ¹³⁵Xe diffusion in, 163
- Uranium monocarbide (molten)
- W solubility in, 211
- Uranium monocarbide particles (irradiated)
- behavior, 13
- Uranium monocarbide single crystals (irradiated)
- point-defect clusters, 87-88
- Uranium monocarbide (stainless-steel clad)(irradiated)
- damage, 160
- Uranium monocarbide (stainless-steel)(304) clad)(irradiated)
- damage, 86
- Uranium monocarbide powder
- ignition, 160
 - synthesis, 161

- Uranium monocarbide system particles (PuC-UC)
 preparation, 7-8
 vibratory compaction, 64
- Uranium monocarbide systems (Fe-UC)
 reaction with stainless steel (316), 159
- Uranium monocarbide systems (NbC-UC)
 creep rate, 212
- Uranium monocarbide systems (PuC-UC)
 preparation, 207
 preparation of powders, 154-55
 reactions with alloys, 159
 reactions with metals, 78, 159
 reduction in H_2 , 161
 sintering, 161
- Uranium monocarbide systems (PuC-UC) (Nimonic 90 clad)(irradiated)
 damage, 86
- Uranium monocarbide systems (PuC-UC) (stainless-steel clad)(irradiated)
 fission-gas release, 212
- Uranium monocarbide systems (Pu₂C₃-UC)
 reduction in H_2 and sintering, 161
- Uranium monocarbide systems (W-UC)
 solidus temperature, 84
- Uranium monocarbide systems (UC₂-UC)
 phase studies, 84
- Uranium monocarbide systems (UC-UP)
 phase studies, 12
- Uranium monocarbide systems (UC-ZrC)
 compatibility with metals, 159
 thermal expansion, 86
- Uranium mononitride
 creep rate, 84
 hydrolysis, 212
 N partial pressure over, 84
 N self-diffusion in, 84
 production, 83
 properties, 84
 reaction with Ni, 12-13
 reaction with Nb alloy, 84
 reactions with Ta alloys, 84
 reactions with W alloys, 84
 reaction with TZM, 84
 sintering, 161
 thermal conductivity, 84
 wetting by liquid Na, 110
 yield from UC₂ reduction, 83-84
- Uranium mononitride (stainless-steel clad) (irradiated)
 damage, 86
- Uranium mononitride dispersions
 cladding materials for, 79
- Uranium mononitride microspheres
 preparation, 84
- Uranium mononitride powder
 ignition, 160
 preparation, 13
 synthesis, 161
 wetting by Na, 176
- Uranium mononitride solid solutions (PuN-UN)
 preparation, 155
- Uranium mononitride system compacts (AlN-UN)
 fabrication, 13
- Uranium mononitride systems (PuN-UN)
 preparation, 207
- Uranium mononitride systems (UN-UP)
 phase studies, 12
- Uranium monophosphide
 compatibility with metals, 212
 density, 12
 melting point, 12
 production, 83
 thermal conductivity, 211
 wetting by liquid Na, 110
- Uranium monophosphide powder
 oxidation, 160
- Uranium monophosphide solid solutions (UP-US)
 melting points, 160
- Uranium monophosphide systems (UC-UP)
 phase studies, 12
- Uranium monophosphide systems (UN-UP)
 phase studies, 12
- Uranium monosulfide
 melting point, 155
 preparation, 14
 production, 83
 solubility in UC₂, 84
 thermal conductivity, 12, 211
 thermal diffusivity, 160
 transient-heating effects, 212
 wetting by liquid Na, 110
- Uranium monosulfide powder
 ignition, 160
- Uranium monosulfide solid solutions (PuS-UN)
 preparation, 155, 207
- Uranium monosulfide solid solutions (UP-US)
 melting points, 160
- Uranium monosulfide systems (PuS-US)
 lattice constants and melting points, 207
- Uranium monoxide systems (PuO-UO)
 stability, 155
- Uranium nitride systems (Pu nitride-U nitride)
 properties, 8, 207
- Uranium nitride systems (Pu nitride-U nitride)(irradiated), 207
- Uranium oxide fuels
 behavior and properties, 81-83
- Uranium rod
 casting, 255
- Uranium sesquicarbide
 thermodynamic properties, 13
- Uranium sheet
 pole-figure measurements, 74
- Uranium silicide (U₃Si₂)
 properties, 86
- Uranium silicide (U₃Si₂)(irradiated)
 behavior, 86-87
- Uranium silicides (U₃Si)
 transformation, 74
- Uranium single crystals
 elastic moduli, 203
 Kossel diffraction patterns, 74
 plastic deformation, 203
- Uranium single crystals (irradiated)
 plastic deformation, 162, 203
- Uranium solutions (Mg-U-Zn)
 corrosive effects, 178
- Uranium system particles (C-U-Zr) (irradiated)
 behavior, 13
- Uranium system tubes (Al-Fe-Si-U) (Zircaloy clad)(irradiated)
 swelling, 2-4
- Uranium systems
 aging effects, 152
- Uranium systems (Al-Fe-Mo-Si-U)
 hardness, 2
- Uranium systems (C-Ni-U)
 phase studies, 211
- Uranium systems (C-U)
 aging effects, 152
 casting, 83
 melting, 83
 melting point, 74
 precipitates in, 152
- Uranium systems (Mo-Si-U)
 phase studies, 74
 physical metallurgy, 1
 properties, 1-2
- Uranium systems (Mo-Si-U)(irradiated)
 swelling, 152
- Uranium systems (O-Na-U)
 phase studies, 5
- Uranium trialuminide coatings
 application and properties, 66
- Uranium tubing
 casting, 255
- Uranium tubing (Zircaloy clad)(irradiated)
 swelling, 3-4
- V
- Vanadium
 compatibility with Pu₂C-U₃C system, 8
 corrosion, 177-78, 230
 ductility, 56
 melting point, annealing effects on, 246
 phase diagrams, 186
 reaction with PuC-UC system, 159
 solubility in molten Zn, 236
- Vanadium alloy tubing (Ti-V)
 fabrication, 198, 256
- Vanadium alloys (Al-Cr-Ti-V)
 friction welding, 68
- Vanadium alloys (Al-Cr-V)
 corrosion, 109, 233
- Vanadium alloys (Al-Cr-V-Zr)
 fabrication, 255-56
- Vanadium alloys (Al-Mo-Ti-V)
 properties, 183
- Vanadium alloys (Al-Ti-V)
 crack growth, 230
 welding, 68, 145
- Vanadium alloys (Al-V)
 corrosion, 109
- Vanadium alloys (Cr-Ti-V)
 corrosion, 257
 creep properties, 186, 257
 fabrication, 257
- Vanadium alloys (Cr-U-V)
 phase studies, 204
- Vanadium alloys (Cr-V)
 corrosion, 109
- Vanadium alloys (Mo-Nb-V-Zr) (see B-66)
- Vanadium alloys (Mo-Ta-V)
 phase studies, 129
- Vanadium alloys (Mo-Ti-V)
 corrosion, 109
- Vanadium alloys (Nb-Ta-Ti-V)
 creep resistance, 53
- Vanadium alloys (Nb-Ta-V)
 phase studies, 129
- Vanadium alloys (Nb-Ti-V)
 annealing, 53
 evaluation, 138
 evaporation, 128
 preparation, 138
- Vanadium alloys (Nb-V)
 (see also B33)
 binary interdiffusion in, 132
 corrosion, 108, 230-31
 evaluation, 138
 interdiffusion in, 188
 mechanical properties, 52
 preparation, 138
 twinning, 52
 welding, 144
- Vanadium alloys (Nb-V-Zr)
 aging, 127-28
 hardness, 128
- Vanadium alloys (Ta-V)
 corrosion, 230
- Vanadium alloys (Ti-V)
 compatibility studies, 8-9

corrosion, 39, 109, 230, 233
 creep, Na effects on, 176
 penetration by molten Pu-Ti-U alloy, 205
 tensile properties, 118
 thermal conductivity, 186
 thermal expansion, 186
 Vanadium alloys (Ti-V)(irradiated)
 He and H production, 192
 Vanadium fused slurry coatings
 development and evaluation, 106
 Vanadium systems (H-V)
 ductility, 56
 Vought IV coatings
 behavior, 231-32

W

Welding, 67-69, 142-47, 260-63

X

X-34
 corrosion, 234
 X-110
 corrosion, 234
 X-315
 erosion, 177
 X-ray radiography, 70

Y

Ytterbium
 W solubility in, 247
 Yttrium
 compatibility with Th, 9
 corrosion, 236
 effects on Ta recrystallization temperature, 185
 phase diagrams, 186
 solubility in molten Zn, 236
 W solubility in, 247
 Yttrium alloy coatings (Ir-Y)
 for Ta, 38
 Yttrium alloys (Al-Cr-Fe-Y)
 (see also 1541 alloy)
 oxidation, 79
 properties, 244-45
 Yttrium alloys (Al-Cr-Fe-Y)(irradiated)
 ductile-brittle transition temperature, 115
 hardness, 115
 tensile properties, 190
 Yttrium alloys (Al-Cr-V-Y)
 fabrication, 255-56
 Yttrium alloys (Al-Y)
 corrosion, 103
 Yttrium alloys (Cr-Y)
 mechanical properties, 53
 Yttrium alloys (Cr-Y)(hydrided)(clad)
 cracking, 97
 Yttrium alloys (Cr-Y)(hydrided)(clad)
 (irradiated)
 behavior, 97
 Yttrium alloys (Hf-Nb-W-Y)
 (see C-129Y)
 Yttrium alloys (Nb-W-Y-Zr)
 (see AS-55 and D-45Y)
 Yttrium alloys (Sc-Y)(hydrided)
 phase studies and thermodynamic properties, 97
 Yttrium alloys (Y-Zr)
 H terminal solubility in, 28
 Yttrium carbide (Y₂C)
 Al solubility in, 131
 Yttrium dicarbide solid solutions (UC₂-YC₂)
 phase studies, 159

Yttrium hydride
 H absorption and thermodynamic properties, 96-97
 Yttrium oxide
 effects on Zr stress rupture, 183
 thermal conductivity, 193
 Yttrium sesquioxide systems (BeO-ThO₂-UO₂-Y₂O₃)
 UO₂ loss, 26-27
 Yttrium sesquioxide systems (BeO-ThO₂-UO₂-Y₂O₃)(irradiated)
 fission-gas release, 27
 Yttrium sesquioxide systems (ThO₂-Y₂O₃)(irradiated)
 ¹³⁵Xe release, 162
 Yttrium sesquioxide systems (UO₂-Y₂O₃)(irradiated)
 ¹³⁵Xe release, 162
 Yttrium sesquioxide systems (Y₂O₃-Zr-ZrO₂)
 thermal conductivity, 193
 Yttrium systems (Al-C-Y)
 phase studies, 131
 Yttrium systems (C-Cr-Co-Mo-W-Y)
 oxidation and strength, 131
 Yttrium systems (C-Cr-Co-Nb-W-Y)
 oxidation and strength, 131
 Yttrium systems (C-Cr-Co-Ta-W-Y)
 oxidation and strength, 131

Z

Zinc
 corrosion, 177-78
 electrodeposition on Be and Zn-plated Be, 67
 Zinc (molten)
 corrosive effects, 178, 236
 metal solubility in, 236
 U diffusion in, 188
 Zinc alloys (Al-Zn)
 corrosion, 103
 Zinc alloys (Cd-Mg-Zn)(molten)
 corrosive effects, 178-79
 Zinc alloys (Nb-Zn), 52
 Zinc solutions (Mg-U-Zn)
 corrosive effects, 178
 Zircaloy
 bonding to stainless steel, 68
 corrosion, 37
 ductility, Zr hydride effects on, 49
 joining, 68, 146
 reaction with steam, 41
 stress-corrosion cracking, 103
 Zircaloy tubing
 lining with Al using explosive welding, 68
 Zircaloy-2
 alloying-element distribution, 243-44
 bonding to Al by extrusion, 198
 corrosion, 36, 103, 174, 229
 creep properties, 56, 58
 fracture, 58
 hardness, O effects on, 50
 hydriding, 28, 33-36, 174
 H charging of, 224
 H segregation, 124
 mechanical properties, 103
 microstructure, 28
 pole figure of hydride plates, 49-50
 preferred orientation, 50
 properties, 124
 reaction with steam, 41
 reaction with UO₂, 81-82
 specific heat, 244
 Zircaloy-2 (irradiated)
 annealing, 114
 corrosion, 35, 229, 240
 creep properties, 114
 dislocation loops, 117
 He production, 192
 H production, 192
 impact properties, 46, 192
 mechanical properties, 114, 240
 oxidation, 229
 Zircaloy-2 cladding
 stresses during vibrating fuel loading, 258
 Zircaloy-2 transition joints (Inconel-Zircaloy-2)(irradiated)
 mechanical properties, 240
 properties, 260
 Zircaloy-2 tubing
 crystal structure, 49
 ductility, H effects on, 28
 grain growth, 49
 preferred orientation, fabrication effects on, 257
 properties, 120
 properties of welded, 183
 strength, 117-18
 stresses during fuel loading, 64-65
 weld cracking, 65
 Zircaloy-4
 corrosion, 103, 229
 fatigue-strength reduction factors, 56-57
 hydride habit, 183
 mechanical properties, 103
 physical properties, 183
 properties, 124
 reaction with steam, 237
 Zircaloy-4 (irradiated)
 mechanical properties, 114
 oxidation, 229
 tensile properties, 114
 Zircaloy-4 single crystals
 physical properties, 183
 Zircaloy-4 tubing
 explosive welding to Al tubing, 260
 properties, 120
 Zircaloy 1027
 corrosion, 40
 Zirconium
 C diffusion in, 132
 compatibility with UP, 212
 corrosion, 177-78
 creep properties, 182
 damping capacity, 124
 effects on Mo recrystallization temperature, 182
 electrodeposition of, 140-41
 embrittlement, Zr₂H₃ effects on, 124
 hydride habit, 183
 H embrittlement, 169, 243
 H permeation of oxide films on, 229
 H terminal solubility in, O effects on, 27
 oxidation, 35, 174
 phase diagrams, 186
 properties, rare-earth effects on, 183
 reaction with steam, 41-42
 recovery, 123
 self-diffusion in Zr hydride, 96, 169
 solubility in molten Zn, 236
 stress rupture, Y₂O₃ effects on, 183
 tensile properties, hydriding effects on, 124
 U diffusion in, 248
 work hardening, 123
 yield point, 243
 Zirconium (irradiated)
 corrosion, 174
 Zirconium (molten)
 WC solubility in, 128
 Zirconium alloy coatings (Ir-Zr)
 for Ta, 38
 Zirconium alloy couples (Mo-Ti-Zr)
 corrosion, 108
 Zirconium alloy couples (Nb-Zr)
 corrosion, 109

- Zirconium alloy couples (Nb-Zr)(carburized)
corrosion, 108
- Zirconium alloy tubing (Nb-Zr)
crystal structure, 49
- Zirconium alloys
corrosion, 36
embrittlement, Zr_2H_3 effects on, 124
hydriding, 36, 169-70
H terminal solubility in, 28-29
H uptake, 174
mechanical properties, 56-58, 182
metallurgy, 49-50
- Zirconium alloys (Al-Cr-V-Zr)
fabrication, 255-56
- Zirconium alloys (Al-Mg-Zr)
creep properties, 251
- Zirconium alloys (Al-Zr)
electrodeposition of, 140-41
- Zirconium alloys (Be-Ti-Zr)
use for brazing, 146
- Zirconium alloys (Cr-Fe-Sn-Zr)
corrosion and mechanical properties, 103
- Zirconium alloys (Cr-Fe-Zr)
corrosion and mechanical properties, 103
- Zirconium alloys (Cr-Zr)
corrosion, 36
- Zirconium alloys (Cu-Nb-Zr)
corrosion and H uptake, 229
- Zirconium alloys (Cu-Zr)
diffusion in, 132
- Zirconium alloys (irradiated)
properties, 46, 115
- Zirconium alloys (Mg-Zr)
creep properties, heat-treatment effects on, 183
- Zirconium alloys (Mo-Nb-Ta-Zr)
(see SCb-61)
- Zirconium alloys (Mo-Nb-Ti-Zr)
(see PWC-533)
- Zirconium alloys (Mo-Nb-W-Zr)
(see F-48)
- Zirconium alloys (Mo-Nb-V-Zr)
(see B-66)
- Zirconium alloys (Mo-Ti-Zr)
(see also TZM)
chemical plating of $MoSi_2$ on, 140
tensile properties, 118
- Zirconium alloys (Mo-W-Zr)
phase studies, 129
- Zirconium alloys (Mo-Zr)
binary interdiffusion in, 132
- Zirconium alloys (Nb-Ta-W-Zr)
(see FS-85)
- Zirconium alloys (Nb-Ta-Zr)
removal of N and O, 63
- Zirconium alloys (Nb-Sn-Zr)
corrosion, 36
tempering, 50
- Zirconium alloys (Nb-Sn-Zr)(irradiated)
corrosion, 229, 240
mechanical properties, 240
oxidation, 229
- Zirconium alloys (Nb-Ti-Zr)
annealing, 53
- Zirconium alloys (Nb-W-Y-Zr)
(see AS-55 and D-43Y)
- Zirconium alloys (Nb-W-Zr)
(see Cb-752, D-43, and X-34)
- Zirconium alloys (Nb-U-Zr)
properties, 204
- Zirconium alloys (Nb-U-Zr)(irradiated)
reaction with water, 161
- Zirconium alloys (Nb-V-Zr)
aging, 127-28
hardness, 128
- Zirconium alloys (Nb-Zr)
(see also D-11, D-14, PWC-11, PWC-33, and PWC-34)
age-hardening, 183-84
annealing, 53
binary interdiffusion in, 132
brazing, 94, 146
carburization, 140
coating with PWK-5, 106, 199
compatibility with Be, 94
corrosion, 35-36, 40, 108, 110, 177, 229-31, 233-34
electrical resistivity, 127
fracture, 58
heat treatment, 183
H segregation, 124
H terminal solubility in, 28
ingot structure, O effects on, 256
joining to Al_2O_3 , 146
mechanical properties, 52, 127
N removal, 63
N solubility in, 126-27, 184
oxidation, 37
oxidative weight gain, 127
O removal, 63
properties, 57-58
recrystallization temperature, 127
strength, 35
strengthening, 127
stress-corrosion cracking, 235
tempered structures, 244
tensile properties, 118
 Zr_2H_3 reorientation, stress effects on, 124
- Zirconium alloys (Nb-Zr)(irradiated)
annealing, 114
creep properties, 114
impact properties, 46, 192
- Zirconium alloys (Pu-U-Zr)
casting, 138
compatibility with stainless steel (304), 5, 205
creep properties, 6
mechanical properties, 75
phase studies, 75, 153
solidus temperatures, 5
thermal conductivity, 153, 205
thermal expansion, 6
transformation, 75
- Zirconium alloys (Pu-U-Zr)(molten)
penetration of stainless steel (304), 205
- Zirconium alloys (Pu-Zr)
solidus temperatures, 75
- Zirconium alloys (Ta-W-Zr)
phase studies, 247
- Zirconium alloys (Th-Zr)
tensile properties, 9
- Zirconium alloys (Sn-Zr)
corrosion, 36
- Zirconium alloys (Ti-Zr)
electrodeposition of, 140-41
H terminal solubility in, 28
- Zirconium alloys (U-Zr)
metallography of hydrided, 170
- Zirconium alloys (U-Zr)(irradiated)
decomposition, 2
swelling, 153
- Zirconium alloys (U-Zr)(Zircaloy clad)
coextrusion, 198
- Zirconium alloys (Y-Zr)
H terminal solubility in, 28
- Zirconium boride powder
coating with Mo and W, 139-40
sintering, 34
- Zirconium boride systems
oxidation, 132
- Zirconium carbide cermets
fracture, 79
- Zirconium carbide hydrides
lattice constants, 170
- Zirconium carbide powder
coating with Mo and W, 139-40
- Zirconium carbide solid solutions (Hf carbide-Zr carbide)
preparation and properties, 101
- Zirconium carbide systems (U carbide-Zr carbide)
fabrication and synthesis, 212
- Zirconium cladding
reaction with steam, 238
- Zirconium diboride
corrosion, 110
hardness, 251
electrodeposition of, 140-41
- Zirconium diboride dispersions (stainless steel(347)- UO_2 -ZrB₂)
properties, 156
- Zirconium diboride (Nb coated) dispersions (stainless steel(347)- UO_2 -ZrB₂ (Nb coated))
properties, 156
- Zirconium diboride mixtures (UO_2 -ZrB₂) (irradiated)
performance, 226, 228
- Zirconium diboride powder
metallic binders for, 172
sintering, 34
- Zirconium diboride systems ($MoSi_2$ -ZrB₂)
tensile properties, 121
- Zirconium dihydride systems (ZrH_2 -ZrC)
lattice constants, 170
- Zirconium dioxide
cationic self-diffusion in CaO-stabilized, 251
corrosion, 40
O diffusion in CaO-stabilized, 251
thermal shock, metal addition effects on, 251
- Zirconium dioxide (MgO stabilized)
corrosion, 40
- Zirconium dioxide coatings
application, 257
electroplating on Ta-W alloy, 259-60
for W, 38
- Zirconium dioxide films
structure, 174
- Zirconium dioxide mixtures (PuO_2 - UO_2 -ZrO₂)
preparation, 82
- Zirconium dioxide mixtures (UO_2 -ZrO₂) (Zircaloy clad)(irradiated)
homogenization of two-phase, 214
- Zirconium dioxide powders
coating with Mo and W, 139-40
- Zirconium dioxide single crystals
O diffusion in CaO-stabilized, 251
- Zirconium dioxide solid solutions (HfO_2 -ZrO₂)
thermal expansion, 172
- Zirconium dioxide systems (CaO-PuO₂- UO_2 -ZrO₂)
melting points, 78
- Zirconium dioxide systems (CaO-ZrO₂)
thermal conductivity, 193
- Zirconium dioxide systems (PuO_2 - UO_2 -ZrO₂)
lattice parameters and stability, 154
- Zirconium dioxide systems (Ti-ZrO₂)
thermal shock, 251
- Zirconium dioxide systems (UO_2 -ZrO₂) (irradiated)
homogenization, 163
- Zirconium dioxide systems (Y_2O_3 -Zr-ZrO₂)
thermal conductivity, 193
- Zirconium dispersions (Nb-PuO₂ particles (coated)-Zr)
preparation, 80
- Zirconium dispersions (Nb-(Pu-U)O₂ particles (coated)-Zr)
preparation, 80

- Zirconium fluoride systems ($\text{BeF}_2\text{-LiF-UF}_4\text{-ZrF}_4$)(molten)**
corrosive effects, 110
- Zirconium hydride**
fracture, 27-28
lengthening, heat effects on, 169
microstructure, 28
rare-gas diffusion in, 96
stability, 96
structure, 96
tensile properties, 124
Zr self-diffusion in, 96, 169
- Zirconium hydride platelets**
reorientation, stress effects on, 124
- Zirconium hydride systems (U hydride-Zr hydride)**
pulse-heating effects, 28
thermal behavior, 224
- Zirconium monocarbide systems (UC-ZrC)**
compatibility with metals, 159
thermal expansion, 86
- Zirconium monocarbide systems ($\text{ZrH}_2\text{-ZrC}$)**
lattice constants, 170
- Zirconium silicide systems**
oxidation, 132
- Zirconium single crystals**
growth, 123-24
- Zirconium systems (Al-C-Ti-Zr)**
mechanical properties at high temperatures, 123
- Zirconium systems (C-Cr-Zr)**
phase studies, 50
- Zirconium systems (C-Co-Zr)**
phase studies, 244
- Zirconium systems (C-Mo-Nb-Ti-Zr)**
fabrication and properties, 51
- Zirconium systems (C-Mo-Ti-Zr)**
(see also TZC)
creep-rupture properties, 118
fabrication, 51, 138
properties, 51
- Zirconium systems (C-Mo-Zr)**
phase studies, 50
- Zirconium systems (C-Nb-W-Zr)**
cold working, 127
corrosion, 233-34
- Zirconium systems (C-Nb-Zr)**
corrosion, 108
development, 52
phase studies, 128
- Zirconium systems (C-W-Zr)**
phase studies, 50, 128
- Zirconium systems (Hf-H-Zr)**
phase studies, 29
- Zirconium systems (O-Zr)**
H terminal solubility in, 28
- Zirconium systems (SiC-Zr)**
oxidation, 132
- Zirconium systems (Th-ThO₂-Zr)**
tensile properties, 9
- Zirconium systems (Y₂O₃-Zr-ZrO₂)**
thermal conductivity, 193
- Zirconium tubing**
grain growth, 49

LEGAL NOTICE

This journal was prepared under the sponsorship of the U. S. Atomic Energy Commission. Neither the United States, nor the Commission, nor any person acting on behalf of the Commission:

A. Makes any warranty or representation, expressed or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this journal, or that the use of any information, apparatus, method, or process disclosed in this journal may not infringe privately owned rights; or

B. Assumes any liabilities with respect to the use of, or for damages resulting from the use of any information, apparatus, method, or process disclosed in this journal.

As used in the above, "person acting on behalf of the Commission" includes any employee or contractor of the Commission, or employee of such contractor, to the extent that such employee or contractor of the Commission, or employee of such contractor prepares, disseminates, or provides access to, any information pursuant to his employment or contract with the Commission, or his employment with such contractor.

